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ORIGINAL ARTICLES.

BEGINNINGS OF THE PSYCHOSES.*

BY W. K. WALKER, M.D.,

OF DIXMONT, PA.;

FIRST ASSISTANT PHYSICIAN TO THE WESTERN PENNSYLVANIA HOSPITAL FOR THE INSANE, DIXMONT, PA.

"No scientific fact is better established than this: that the functions of mind depend upon processes going on within the cells of the cortical layer of the brain." The myriad cells of which the brain is composed are supplied with an enormous quantity of blood through vessels more numerous than are distributed to any other organ; they present phenomena of nutrition, which they share in common with the other cells of the body and with the body as a whole; they receive impressions through incoming strands of minute conducting threads from every one of the fundamental cells of which the various tissues and organs are built up, and send forth impulses which govern and regulate all the functions of the latter.¹ Nowhere in the realm of organized matter is there found a more intricate physical organization than in the arrangement of the constituent cells and fibers, or nutritive functions so active as in the cortical areas of man's highest and latest developed organ. We must regard them, therefore, as representing foci of chemical phenomena among the most complex in nature.

For its specific activities of "sensitiveness" and "conductivity" brain-cell depends upon a colloidal structure so unstable of constitution that it instantly responds to the slightest vibrations of light and sound waves and the chemical influences transmitted to it by way of the organs of special sensation. More than this, it permanently incorporates in its internal structure results of these influences, as evidenced by its facilitated readiness of response to subsequent impressions of like nature.

Impressions of sensory experiences thus remaining in nervous centers are manifested as phenomena of memory. In the imprints wrought into their organization by heredity we discern "vital potentialities," or "predispositions"; in those resulting from acquired experiences (habits) we study "functional dispositions." Both are intimately bound up, therefore, with their nutritive processes.² Differences of internal structure, due to modifications of body fluids, from which the cell structure is built up and continually renewed, necessarily result in disturbances of function; and these are manifested by different sensations produced in individual consciousness, or by different peripheral results of these centrally acting influences.

Variable degrees of vitality exist—not only in different organisms and species of organisms, but also among the different cells and tissues of which individuals are composed. This difference of vitality may be due to congenital structural defect or to inherent peculiarity of elaborating and assimilating nutrient materials, with derangement of specific activities proportional to the nutritional defect. Equally with other organs the cells entering into the formation of man's highest organ exhibit different degrees of vitality, with consequent variation of their nutritive and specific properties. Any cause lowering the nutrition of the general system is apt to be first felt by such vulnerable cells, and any slight additional stress, whether from their own functional activity, or autogenous and endogenous poisons, may suffice to bring about a maladjustment of the body forces varying in severity with the degree of inherited or acquired vulnerability of the living substance of the cortical brain areas and the conducting paths.

In this controlling and regulative mechanism which thus welds the separate units of the body into a single whole we have represented the sum-total of the body's activities; all that characterizes man as an individual, physically, mentally and morally—(for it is in the highest associative relation of cortical cells that the moral traits have their origin)—and to it also must we look for the physical basis of consciousness.

We know that consciousness, with concomitant association in memory of the body's sensory experiences, suffers profound modification as a result of the various "accidents that touch the brain." We very commonly see entire abrogation of consciousness from traumatism to the brain mass, with accompanying impairment of subsidiary brain and body functions; from damage to its structure produced by causes acting from within, such as hemorrhage, thrombosis, neoplasms and gross organic disease of its blood vessels; from the chemical influence of anesthetic and narcotic agents, such as ether, chloroform and opium; from the sudden withdrawal of oxygen as in syncope; down through the less striking, but no less unmistakable involvement by poisons acting through longer periods of time: I refer to toxins of the acute infectious diseases and the poisons of alcohol and lead, gout, rheumatism, etc. All of these are known to exert a so-called selective influence upon nerve-cell structure and to be capable of producing disturbance among the body's sensory, vasomotor, secretory and motor functions; and, also, through a loss of the quality by which impressions of past sensations are retained, a corresponding defect of the higher associative functions, that is, the power of associating ideas.

* Read at a meeting of the Pittsburg Academy of Medicine, April 11, 1905.

In our quest for disturbing factors within brain-cell mechanism we need not resort, however, to these well-known agents of destructive alteration; for Hodge and others have satisfactorily demonstrated the existence of chemical and structural changes in nerve-cell as a result of its excessive functional activity. These are earliest manifested by alteration in the nucleus, which presides over the nutritive functions of the cell, with distinctly lessened capacity for transforming incoming impressions into outgoing impulses.

Cerebral cortical cells normally exert influence by which the functional balance of both the organs and the mental faculties are maintained, without any participation of consciousness in the process. When the normal adjustment is disturbed, however, incoming impressions not only fail of proper transformation into outgoing regulative impulses, but are unduly obtruded into consciousness. Whether the maladjustment be due to congenital defect, to structural or chemical alterations from poisons, or from diminution in the amount of their food-supply, it is produced by abnormality of these cortical "machines of associative memory"; and resultant modification of their sensitiveness and conductivity is made manifest by their altered mode of responding to their habitual stimuli.

The stimuli which influence this reaction mechanism are not only those immediately acting through special sense and bodily organs, but they include the stored-up impressions from previously experienced sensations—those entering from the external world, and from his bodily processes as well—together with the correlated and mutually influencing mental states. These exist as "tendencies" to outgoing impulses and are manifested by change in subjective feeling, or outwardly exhibited objective signs, as in facial expression, pallor, blushing, etc. The individual becomes conscious of himself as a personality separate and distinct from his fellows only through these stored-up and incoming impressions; they become his "point of contact" with the world in which he lives, and, in sum-total, they constitute all that is *realized* by him. Some of these ingredients of personality can be enumerated; those, for instance, which are constantly or more frequently reproduced in memory; that is, presented to consciousness oftener than others: the visual image of the body so far as it lies in the field of vision; sensations of touch, as the contact of clothing, temperature, the positions of members, the sound of the voice, together with the sensations connected with separate parts and functions; the regular recurring appetites—hunger, thirst, sex, and the cravings and desires which, consciously or unconsciously, are associated with them; the organism's interests in regulating and subordinating these instincts and desires, or in satisfying and providing for their further gratification in consonance with civil status

and with established laws, customs and conventions. Certain beliefs, ideas and social interests and cares founded upon his physical needs thus become, in the course of man's development, essential memory-constituents of his personality. In this inventory are briefly itemized some of the stimuli which, derived from many sources, constantly influence the individual organism.³

These ingredients of personality are susceptible of further analysis; and they have been painstakingly studied by investigators in many fields. They are not constant in any individual, but vary with the time of life, degree of culture, inherent tendencies and immediately influencing surroundings, including among these latter the state of vitality and general health with all that these terms imply. At any given time, therefore, the consciousness of self is merely an artificial separation of those constituents of memory which occur most frequently in our perceptions. The very essence of man's personality consists of this association in memory of mutually influencing bodily sensations and mental impressions, with cortical brain cell as their meeting place. To the specific activities of this cell must we look for the explanation of normal mental phenomena; and to modifications of these activities by the processes to which cortical cell is subjected for elucidation of abnormal mental phenomena. Whether we label these latter as neurasthenic, hysteric, hydrochondriac or insane, it is to this point they must be traced if we are adequately to comprehend and interpret them.

A feeling of health and energy with tendency to outlet in normal and customary activities is indicative of equilibrium among the brain's nutritive processes. It has been truly said that "we are not so sensible of the most robust health as we are of the least sickness." In the interplay of the sensory ingredients of mind as they occur in vigorous health, therefore, "the brain should be as non-existent for consciousness as the stomach. But the nervous sufferer has data inaccessible to his healthy fellow, and is reminded of the psychophysical connection by a thousand distressing sensations" (Strong). With any disturbance of the normal equipoise, whether from emotion, or from modification of the molecular constituents of intracellular or extracellular fluids, there are obtruded into consciousness disordered sensations of some sort; these are connected with the bodily or with the mental processes, or both.

Since functional alterations and adjustments are continually occurring among the body processes—adjustments by which the incoming impressions are correlated and harmonized with retained imprints of former sensations and images—we find in proportion as they are gradually or suddenly brought about, or act upon an unduly sensitive or unstable reactive mechanism, a resultant variation among vasomotor, secretory, and motor processes. Familiar bodily accompaniments of the emotion may be used as illustrations of this: in the pallor of fear and the livid-

ity of anger—enduring but a moment and disappearing with the cause—are demonstrated the intimate association of subjective feelings with bodily functions. And we constantly find those we regard as normal shading off into degrees which must be deemed abnormal, as measured by their intensity or their duration. Take for instance the involvement, from sudden emotion, of salivary, renal, and dermal secretions; and the more gradually induced depression of all the functions as a result of grief and anxiety. Only less apparent are transitory lapses of the appetites, with their accompanying desires, from physical exhaustion or from intense emotions; disorders of motility of stomach and intestinal walls; temporary disorders of digestion from excess, deficit, or perversion of the various secretions concerned therein, with consequent fermentation or putrefaction within the digestive canal and the production of poisons which, in turn, produce pathologic changes in the blood and resultant alterations in nutrient fluids; malnutrition of nerve centers is thus brought about, with further disturbance of the mental functions. In disorder of the sensory, secretory, excretory, and circulatory functions of the skin—"that wonderful mosaic of many organs" and "mirror of the nervous system" (to which it is so closely related in embryologic origin)—we have multiplied evidence of the organic oneness of mind and body function. Through its meshwork of minute blood vessels which respond so promptly to emotional states, we are enabled to read the innermost emotions of shame, anger, and fear as unerringly as we do some of the gastric, enteric, and toxemic disorders which are turned over to the skin-sheet for presentation.⁴ From vasomotor reactions so general and excessive as to bring about altered conditions of blood pressure resulting in syncope or (if disease of the blood vessels exists) in apoplexy; or in the petechial hemorrhages observed in certain hysterical states, we have occurrences of like significance though differing so widely in character and in degree.

In the bodily resonance and reverberation to mental states of longer duration we have protean manifestations of disordered cortical activity. They may be said to include all imaginable combinations of sensory, secretory, and vasomotor disturbances, influencing, together or separately, the vegetative, organic, and motor spheres. With the frequent repetition of such states we find a tendency to groupings of reactions—to the establishment of symptom-complexes involving vulnerable and overworked organs or systems. Or, we find because of the dissipation of the brain's energies through a single channel by its excessive cortical activity or intense and rapid alternating emotions, the involvement of many functions. Depending upon the line of least resistance in a given individual, resultant maladjustment is variously exhibited: it may be in mere hypersensitiveness to the normal bodily stimuli, or in diminished resistance to pain. Notable in-

stances of hypersensitiveness to stimuli resulting from physiological function are to be observed in sensitive women during the menstrual period associated as it is with marked changes in the body's sensory, vasomotor, and chemical processes, not to mention its emotional and mental concomitants. Most marked are the perturbations occurring at the establishment of this function and throughout the evolutionary and involutional processes of the generative organs, as well as in the profound physiological changes which accompany their highest functional activity in gestation and the puerperium. Very numerous are the sensory disturbances within the pelvis which must be regarded as the effect and not the cause of pathologic nerve states.

Because of the exhaustion of certain groups of brain cells, or of their lack, or impairment of their activity from any cause, there may be an inability to attend to its multiplicity of sensory experiences, and we find those not immediately essential to the organism's existence extruded from consciousness; various anesthetics and analgesics result with associated modifications of conscious desires, appetites, and emotions. With profound duration or greater intensity, habitually excessive, perverted, or abnormal reactions to the organism's innumerable sensory stimuli become greatly facilitated; with each repetition additional traces are left in the nervous centers as memories; these become organized, so that although the original cause or causes of the abnormal reactions may be removed and the sensory and psychic accompaniments effaced, their imprints remain as functional dispositions which tend subsequently to be called into existence with greater and greater facility, and, finally, with totally inadequate external cause. Whatever be the exciting circumstance calling for readjustment of the bodily forces, attendant sensory disturbances are thrust into consciousness. The hypersensitive individual accustomed to note slight changes and habitually to select certain kinds of sensations from among the many which influence him, pays special attention to new or unusual ones thus suddenly and vividly presented to his consciousness; and, by preference, he attends to these even when they are of little intensity.

In the normal individual no one class or set of sensations continuously holds first place; they become effaced by successive states of consciousness. But while the stream of consciousness constantly varies, its changes occur in accordance with definite laws; they are determined by bodily states, and are the resultant of the sum total of impressions (retained and incoming) which influence him at that particular instant. *What* the cortical cell deals with depends upon the experiences to which it has been—and is being—subjected; *how* it deals with or transforms these sensory experiences depends upon its anatomic perfection, chemical constitution, and previous habit, consequently upon the degree of perme-

ability of its conducting paths. Viewed by the light of the physico-chemical changes to which the colloidal materials are subjected we can better comprehend the variations and vagaries in the mechanism of transformation of its sensory materials into outgoing processes, and the influence of these changes upon cortical and perceptual processes; that is, in determining what sensations shall and what shall not occupy consciousness.

All mental development is conditioned upon the retention of sensory impressions in cortical cells. Our mental representations must—in part or in entirety—be regarded as the “echoes” or reflections of the world of sensations. These reflections are, under certain conditions, susceptible of study as “after-sensations”; and painstaking investigation of these phenomena by laboratory methods has thrown much light upon the mechanism not only of normal, but of abnormal mental states. Without further going into the results of psychological studies of “vestiges of sensation,” “after-sensations,” and “after images” I may here state that they are closely allied to memory—and imagination-images. Their chief interest from the clinical point of view lies in the fact that not only do sensations leave more or less lasting impressions capable of subsequent revivification in memory; and that normally these vary in character with the condition of peripheral sense organ and of cerebral cells; but also that vivid sensations from abnormal processes as of pain, together with the “internal” states which originally accompanied them, are capable of like revivification in memory with the production of all their outgoing consequences, mental as well as physical; and this may result from some slight peripheral or external cause or from centrally excited processes.

The importance and far-reaching consequences of centrally excited processes, which are conditioned by the quality of “memory” inherent in nerve-cell, can not be exaggerated; for to the influence of the stored-up sensory processes associated with the vegetative and organic functions—the “organic sensations” or “feelings”—and to “the inner nerve-action that converts the functions of the senses into mental life” do we trace much that is morbid in psychic function.

In the sensitive, vulnerable, and unstable organism the slightest influence which modifies, perverts or disorders peripheral processes becomes of important significance and should never be disregarded. It is the central (cortical) process, however, that we are prone to overlook; and it is the only one in any way explanatory of the difficult clinical problems which these cases present. Of etiological significance among the conditions influencing these central processes (physicochemical and sensory)—are those known to act upon the “colloidal machines” of the cortical areas in which sensations, images, ideas, emotions, and the bodily activities are coordinated and controlled. A single persistent or dominant

idea may cause maladjustment by shutting out all other ideas which otherwise might come to consciousness to exert their controlling influence, but essential even for this to an inherent vulnerability (diminished activity) of the colloidal machines of associative memory—the cortical cells. General exhaustion from any cause so limits their associative activity, and influences directly affecting them, such as fatigue, from their excessive functional activity, grief, disappointment and anxiety; also narcotics, intoxicants, and the processes are so patent that even the uninitiated may read them. Where two or more of these causes meet in their influence upon the aggregation of cells entering into the formation of the “thought organ” injurious results become proportionately intensified.

The intimate relation of after-sensations which thus result from exhausted or toxic states of cortical cells, to sensation on the one hand and to memory and imagination on the other furnishes the underlying basis of many clinical conditions or entities. Take that widespread tendency, for example, which follows eczema, and all sorts of itching eruptions, to become worse at night “just as the cortex is beginning its automatic vagaries. Night-itching would appear to be a sort of dreaming on the part of the skin, an aimless flashing hither and thither of swollen rumors of half-imaginary irritations, when the stern control of cerebral inhibition is withdrawn.” I can give you no better illustration of the manner in which bodily sensations are subject to elaboration under all influences limiting, modifying, or interfering with the higher cortical activity. Of like nature are many of the subjective sensations originated through the special sense of hearing, sight, etc., elaboration of sounds produced in the middle or internal ear by disease of the mucous surfaces or other parts associated therewith, or of sounds due to the impaired action of the pharyngeal muscles resulting in some unusual symptom which is brooded upon. After-images evolved from subjective visual sensations are similarly explained. The last named have been exhaustively studied with results illuminating and further explaining the influence of the mental attitude in keeping up and in elaborating symptoms which have origin in real peripheral disturbances.

The special senses are more directly associated with (because essential to) man's mental life and development than are his “organic sensations.” Any deviation therefore, from the normal functioning of the former, as of after-images, becomes more apparent, and the influence of this deviation upon the mental state more readily traced. But after-images are known to exist not only for all the senses but for the emotions too; that is for the bodily reactions which, in their sum total, constitute the emotions; and these after-images are all alike produced by processes going on within the neuroplasm of brain cells, however such products may be externalized.

Their development is normally instanced in "states in which we are conscious of no particular sensation but yet are not asleep; when we are alone, in the dark, in complete silence, and oblivious of our surroundings. The experiences (sensations from the past) which are marshaled before the mental eye, mental ear, taste, smell, or touch, are quite as real (not objective, however,) as sensations themselves and play quite as important a part in our lives" (Wilfred Lay). The thrills we feel as we think of any joyous emotion; the sensations of distress or of pain as we recall a disappointment or cause for worry, anger, grief, or fear; and conversely, the feelings of emotional depression and of irritability outgrowing from exhausted and abnormal physical states, are instances which illustrate how bodily sensations shade off into emotions. Thus closely associated in the normal processes of mind the intimate relation of after-sensations with sensation on the one hand and with memory and imagination on the other is even more readily demonstrable as a result of exhausted or toxic states of the organism. Further consideration of this phase would lead us far afield in psychological and psychopathological processes and away from the object of this paper. It is sufficient to state that the normal process, as we now know it, elucidates the abnormal into which it so imperceptibly merges. Whatever the source of the original sensations of discomfort or pain, the residua or vestiges remaining in the nerve-centers play a most important part in the production of the psychoses—are the ingredients, in fact, which, further elaborated by the cortical cells, constitute the various psychoses. It must be remembered that whether as upsurging sensations of pain, or merely as hypersensitiveness to normal, unpleasant or perverted sensations, their importance is derived from the mental attitude of the sufferer toward them. In the early stage the process of elaboration goes on subconsciously, or at least, is but dimly represented in consciousness. With their frequent recurrence they more and more usurp his attention. Whether they act but momentarily or continuously bombard his consciousness, this attitude is one of frequently directing his attention toward them, or of constantly brooding upon them, so that other sensations are excluded from consciousness. Thus aggrandized in importance, subjective sensations become further elaborated and there is an attempt on the part of the patient to explain them, with the development of the multiform hypochondriacal phases we so commonly encounter.

Bodily and special sense impressions are not the only ones attended to under conditions of exhaustion, toxemia, intoxication, and disease; for associated mental sensations (images, ideas, emotions, and desires) are even more habitually presented to consciousness. Indeed; it is the emotional concomitant that is oftener recalled to memory; and this recollection may occur long after the original sensory excitant is forgotten.

Equally with sensations these mental experiences leave their vestiges or residue; and they are subject to the laws of memory and of habit as are all other nervous processes. Moreover these varying emotions are often directly traceable to the bodily sensations, as the peevishness from exhaustion and bodily pain; their functional equivalent, irritability, betokens lessened power of associative memory: that is, of marshaling before the mind's eye and coördinating and controlling mental images, ideas, emotions and instincts. In place of irritability there may be dulness resulting from the lessened facility with which cortical cells transform their impressions into outgoing impulses; this retardation of the impulse gives rise to an increased "sense of effort" which may vary from normal fatigue and exhaustion to lack of ability to think clearly or with normal rapidity, with a corresponding sense of impotence and of utter helplessness either to resist or to do.

-Because of the mind's inherent tendency to cognize and recognize its experiences, whether these are of bodily sensations of well or ill-being, or of its associated special sensations, images, ideas, and emotions, they become variously combined and rearranged as a result of mutually influencing body and brain habit. The faculty of memory inherent in nerve-cell makes it possible for these experiences to be evolved or reproduced independently of external stimuli, that is, from retained impressions; this is accomplished by the imaging faculty, and the now centrally acting stimuli are capable of producing peripheral phenomena of great variety.

The character and mode of evolution of morbid mental processes vary with the cause and with inherited or acquired vulnerabilities of given cortical areas. We know that much used, overworked, organs are easily thrown out of gear; especially is this true of overworked brain tracts.⁶ When we consider how delicately poised is the vasomotor regulative mechanism, how the caliber of thin-walled and yielding cortical vessels alters with ever-varying activities and emotions; how these vessels respond to excessive demands from habitual overactivity of the brain cells which they supply, we are better able to understand why peculiarities of nerve-cell activity become as one with its nutritive processes; that is, literally bound up with them. The stress from modern modes of living calls for long-continued over-dilatation of cortical vessels; this condition tends more and more to permanency; there is gradually lessening resiliency of their walls which, finally, are unable to recover their normal elasticity. Sluggishness of the blood-stream results and there is consequent engorgement of lymph spaces with poisoned food materials. Impairment of the bodily secretions inevitably follows; these now exert their baneful effects, not only upon nerve-cell but also upon the delicate lining of nutrient vessels. With these definite structural conditions accounting for habitually low nutritive

processes in brain cortex and other organs there is required but slight additional poisoning, whether by alcohol, by the toxins of acute disease, rheumatism, gout, or syphilis, to lay the pathological foundations for those forms of progressive mental deterioration and insanity known to accompany gross organic disease of brain tissues and blood-vessel walls.

In these random reflections regarding a subject so vast in its ramifications I have attempted to present some of the earliest clinical data with which we must deal in our estimation of developing disorders of the mind. We know that, however sudden the irruption into consciousness of an insane idea, however abrupt its manifestation in violent deed, there is an earlier period of incubation often long in duration. Available data of this latent period are found in the patient's sensations, images, and ideas, which mark the gradual deviation from normal function. Multi-form in their subjective aspect, these hidden processes present objective signs in the emotional attitudes of the patient toward his spiritual, social, or physical welfare. The outgrowth of defect in anatomic endowment at birth, or of nutritional disturbances within the body or the nerve-cells from fatigue, stress, poisons, or gross organic disease, the mechanism of their further evolution into mental disorder must be studied by the light of laws governing the special sense organs, with their neural connections, and the perceptions and apperceptions associated and correlated in memory through the instrumentality of attention; their recollection and recombination under the influence of the imaging faculty, and their known tendency toward expression in action.

The materials which are turned into morbid mental traits are the same in kind as those which constitute normal human nature. Their transformation into abnormal processes results from the "productive (though morbid) action" of cortical cells. Only as we know these mental elements and the intricate details of their mechanism as they form themselves into new associations which, through habit, become "fixed," "set," or "organized," can we grasp the pattern of morbid mental-complexes into which they are woven, and intelligently attempt to modify and transform them into physiological processes.

In approaching the study of mind by way of its ingredients, by its manner of growth and development, and its method of coördinating, readjusting, and accommodating the ever-varying bodily sensations with previously experienced and remembered impressions, and of transmuting them either into the quiet orderliness of images, ideas, beliefs, and judgments; or into conduct as exhibited in well-ordered bodily and social activities, we find that in its normal and integrative functions, as well as in its abnormal and disintegrative phases—its disorder and disease—"tis still a man with whom we have to do of whom the conditions are wonderfully corporeal" (Montaigne).

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GALVANISM AS A CURATIVE AGENT IN NERVOUS DISEASES: THE IMPORTANCE OF EQUIPMENT AND TECHNIC.¹

BY WILLIAM BROADDUS PRITCHARD, M.D.,

OF NEW YORK;

PROFESSOR OF NEUROLOGY, NEW YORK POLYCLINIC; CONSULTING NEUROLOGIST, SMITH INFIRMARY; ATTENDING NEUROLOGIST TO THE CITY HOSPITAL, ETC.

It is quite probable that both entertaining interest and educational enlightenment might result from a discussion of medical electricity along the lines of scientific and physiological interpretation. We are not yet, however, in a position, in this aspect of the subject, to do more than to reiterate old or hesitatingly advance new hypotheses, neither the old nor the new having any firmer foundation, in fact, than inductive plausibility.

Medical electricity is not yet a science. We do not know any more demonstrably or with any nearer approach to convincing accuracy than in the past, either what it is or what is its *modus operandi*. The scope and purpose of this paper is entirely apart from any such academic discussion. We can afford to wait with both propriety and profit until further research shall have replaced conjecture with fact. It is with the practically useful and beneficially active aspect of the subject that I shall deal. We do not know what it is or how it acts, but we do know something of what medical electricity does.

It is exclusively, too, from the standpoint of personal experience that I shall present the subject with a further restriction to a consideration of galvanism alone and in the single field of neurology. Other currents are useful in this field; faradism, the static current and quite probably the X-ray, but in much more limited degree and with far more of inconstancy in results.

Not all neurologists are in accord in estimating the value of galvanism in the treatment of nervous diseases; still less of harmonious unanimity is there as to its scope of remedial or even palliative application. By some it is esteemed as of but slight value and in an exceedingly limited field. By others it is held, with even less foundation in fact, as of widely general application and correlated curative effect. All neurologists of to-day are unanimous in according it some degree of usefulness, however limited. With such sponsors as Duchenne, Erb, Charcot, Gowers and many others, there can be no question of its legitimate place.

Personally I am positive in my conviction that it is an agent of demonstrable value, though by

¹ Read before New York County Medical Association, April 17, 1905.

no means indiscriminately applicable. On the contrary, its field is relatively limited, and it has no place as yet in the numerical majority of neurological cases, or, if a place at all, only as an aid in some collateral way to the end desired.

In organic central lesions with destruction of tissue, its employment, with any hope of remedial or directly curative results, constitutes an instance of the *reductio ad absurdum*. Hemiplegia, degenerative myelitis, necrotic softening from any cause, are, with rare exceptions, of this inappropriate group. Personally I have never seen any decided *propter hoc* benefit in tabes from this or any other current, although Erb recom-

Fig. 1.



Forehead.

mends it as distinctly helpful in this affection. In actively inflammatory or actively irritative central diseases, as meningitis, acute myelitis or in brain tumors, it is positively and obviously contra-indicated. In the nuclear palsies, including poliomyelitis—although this disease is not usually so classified—I have never seen any specific benefit from its use, nor do I see on *a priori* grounds any rational basis for such belief.

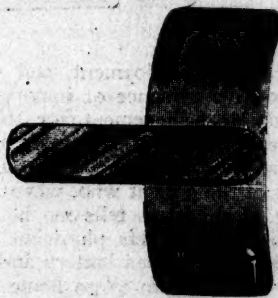
It is, however, in the field of peripheral nerve diseases, including many of the neuroses, nearly all forms of neuritis, the tics, vasomotor and trophic affections, and the paresthesiae of whatever cause, that galvanism occupies a position of positive and indispensable importance. To this group I would add, from experience, the fatigue psychoses, the headaches and cerebral conditions underlying the obsessions of neurasthenia, and of simple affective melancholia. This is really the field of selective usefulness for this agent; again and again I have seen the helmet or cincture headache of the neurasthenic, or the postcervical or occipital ache of the melancholiac, disappear as though by magic under its influence. In noting the effect on the tired headaches of neurasthenia, the simile or analogy of recharging a run-down battery has often occurred to me as aptly suggestive in explaining the phenomenon of benefit or cure.

Even in this field of selection, however, galvanism is rarely, if ever, a specific. Let me

further emphasize this statement: I know of no nervous affection for which electricity, or, for that matter, any other single agent is a specific. We have no specifics in neurology unless it be in tetanus or other similar diseases, which diseases are very questionably classified as neurological. Iodide of potassium will cure brain or cord syphilis very often, but the iodide is a specific for the syphilitic or metasymphilitic rather than the neurological factor in the case. Nervous function is too varied and multiple in manifestation to admit of a single measure or remedy for its restoration. Many measures may be cooperative and equally important necessities in securing a cure in a single case. Rest, environmental changes, control of morale, massage and passive exercises and assistance from drugs are among the more important and legitimate resources generally recognized. Add to these in appropriate cases galvanism and count it as of equal importance and value as an adjuvant and you have my personal estimate of its therapeutic status.

To get the best results, it is necessary to have a proper equipment and to know how to use it—a good workman and good tools are both essential to good work. Precision in dosage and a guiding principle in the method of application are just as vitally important in employing electricity as accuracy in the dosage or in the selection of appropriate media for solution or in an observance of chemical laws in drug administration. One does not guess at the dose of strychnine; one should not guess at the quantity

Fig. 2.



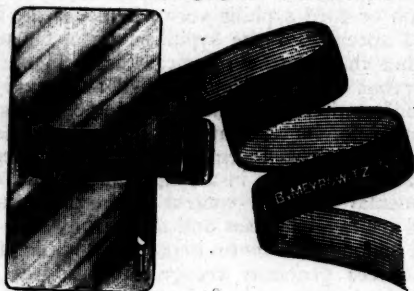
Neck.

of electricity to be given. You give large doses of quinine for one purpose and quinine in very small doses for an entirely different purpose. And yet to administer galvanism with intelligence and appropriateness and resultant benefit does not demand necessarily any special expert knowledge or elaborate equipment. A satisfactory and complete outfit, simple in construction and management, with ample current, equipped with all necessary accessories, including meter, rheostat and proper electrodes, can be obtained to-day and at a nominal cost. The accessories mentioned are absolutely essential: the meter for accurate dosage, the rheostat for perfect control

of the current and proper electrodes to localize properly your current where needed.

It is remarkable that with an agent of acknowledged value for more than a century there should still prevail such haphazard methods and

Fig. 3.



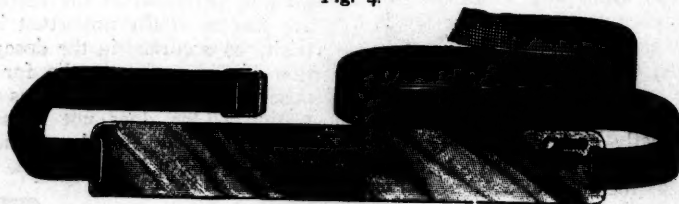
Spinal.

absolute lack of systematized technic in its use. Galvanism's stepsister, the X-ray, an infant by comparison, has been treated with far more dignified consideration; an elaborate technic and most highly specialized expertness are admittedly

they are to-day the standard equipment distributed by nearly all manufacturers. This little disk has kept medical electricity, in one field at least, marking time for a hundred years. It has absolutely no place or useful purpose in your equipment; not only are they a physiological insult, they are an hygienic and an esthetic offense as well, collecting filth each time employed and becoming quickly offensive in odor and appearance. Nothing has been more effective in retarding the advancement and recognition of electrotherapeutics than the stupidity of manufacturers, although the negligence of medical men has been no inconsiderable factor.

The set of electrodes which I show you represents very little of originality in conception. They are all essentially based upon the Erb electrode. Certain modifications and adaptations, however, have been evolved from experience which I believe to be of distinct practical value and importance. Briefly summarized, these modifications are as follows and for the following objects: The electrodes are made of pliant metal, permitting even adjustment to all surfaces, especially when covered. Instead of a permanent covering, I use clean towels, several

Fig. 4.

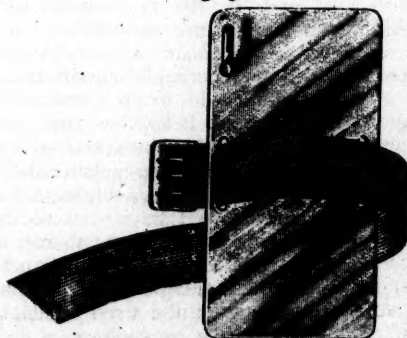


Intercostal.

demanded in its employment, and yet there is far less positive evidence of important value in the records of achievement for this agent so far, whatever may be its future, as compared with galvanism. An old and familiar story to me is that of the patient who, when advised that galvanism is indicated, tells me he has used it with no benefit, that his physician had tried it or had told him to get a battery and use it himself. As well tell him to go home and operate on his own hernia or apply his own spinal brace. Inquiry revealed the fact, as a rule, that it was a faradic battery of very limited use in neurology and in many cases positively harmful and distinctly contra-indicated. If a galvanic battery, it was without meter or rheostat, leaving the patient to guess at the quantity by his sensations, an absolutely unreliable standard; and to the often harmful effects of interruptions and shock from lack of current control by the rheostat. Finally, as a crowning folly, in nineteen out of twenty instances, the electrodes furnished were those little 1 by 1 sponge-covered metal disks on the end of a stick, so familiar to you all. I know of no more farcical persistence of a paleozoic relic than these little disks, and yet

times folded to a sufficient thickness, and thoroughly wet in hot water. Salt water is not necessary. The towel edge should overlap the metal to prevent burning or local concentration of the current. The electrodes are made as

Fig. 5.



Footplate.

large as possible, in order to get a maximum of diffusion at the point of current contact, with a resulting minimum of discomfort as one object, and sometimes a maximum benefit from a

maximum amount of electricity for another. The smaller the electrodes the less the amount of current we can use, because of the irritant and often harmful concentration. With large electrodes also, the prolonged use of the current is easily possible. Seances of less than twenty minutes are the exception; an hour is often indicated as in old sciatica or sacrolumbar neuralgia. Most patients suffering from nervous diseases are "nervous," fidgety, restless. You must make them comfortable for the twenty minutes or the hour required. With this object, these electrodes are equipped with a strap attachment securing firm fixation, thereby insuring freedom from pain and shock from interruptions far more positively than if held by an

Fig. 6.



Hand.

attendant, whose hand, from fatigue or inattention, becomes unsteady. By this method the patient is free to change constrained and wearisome positions from time to time. He can cross his legs, put his feet on the table, handle his book or cigar, although it may be a sciatic or an ulnar or a facial nerve or a headache you are treating. Equally important is the state of mental relaxation from reassurance as to freedom from the fright and danger of shock from interruption. I have had the binding posts attached in the plane of the electrode instead of at right angles as usual, the latter making a lump which interferes with comfort. After use the electrodes are wiped dry, preventing corrosion. A set will last indefinitely.

105 West Seventh-third Street.

APPENDICITIS: MEDICAL AND SURGICAL.

BY R. R. KIME, M.D.,

OF ATLANTA, GA.;

GYNECOLOGIST TO TABERNACLE INFIRMARY.

In presenting the subject of appendicitis I am not writing for such men as Morris, Deaver, Kelly, Price, Murphy, Ochsner or the Mayos, but from the standpoint of the average surgeon and general practitioner. Such men as those mentioned, with their skill, experience and facilities, can reduce their death-rate to a point which the average surgeon throughout the country cannot. So, in discussing this question, if the appendix in the common vernacular should inquire "Where am I at?" I would say between the surgeon and general practitioner in the deep blue sea of future investigation.

It has been but a short time since the fiat of

the radical surgeon was, Operate as soon as a diagnosis is made—but the present tendency is to modify that edict to some extent. Another statement equally as radical is that appendicitis has no medical treatment. The leading surgeon that operates on one or two thousand cases in one or two years sees more of the severe cases than the mild, and so it is with the prominent general practitioner whose work is mostly consultation.

Hospital cases fall under the same class. The mild cases are the ones handled first hand by the general practitioner, not deeming it necessary to call in a surgeon or send the patient to the hospital. It is self-evident to any reasoning mind that a hurried operation within the first forty-eight hours of an attack with an ascending inflammation and infection, with imperfect home surroundings or with the annoyance and anxiety incidental to transference to a hospital, will have a higher death-rate than an interval operation deliberately planned and executed. This being true it is only necessary to demonstrate that a greater number can be safely carried to the interval period. Just what the death-rate is in first attacks of appendicitis operated upon by the average surgeon or treated medically by the average physician has not been settled. From my limited observation and experience I am fully convinced that first attacks of appendicitis judiciously and properly treated will give a greater per cent. of recoveries than can be secured by the average surgeon in operating as soon as a diagnosis is made.

Understand, I do not condemn operation during the first forty-eight hours, in fact advise such when the circumstances demand it, but I do condemn as unsound and unscientific the command to operate as soon as a diagnosis is made. The assertion that appendicitis is a surgical disease and has no medical treatment is productive of much harm. I am aware that this is a surgical age, and that the American people and surgeons have appendiphobia to such a degree that it is unpopular to say a word against the surgical fad of the day. As a further evidence of this surgical tendency, we note that a medical college in the midst of us has five or six professors to teach surgical subjects, and but one to teach the unimportant subject of General Medicine. In the March, 1905, issue of *Amer. Surg. and Gyn.* are articles by different men claiming appendicitis, pneumonia and typhoid fever as surgical diseases. The surgeon is an active worker, aggressive, progressive, and seeking new fields to conquer, while it seems the general practitioner is playing the Rip Van Winkle game.

I do not condemn surgery, as I do a little of it myself, but it should be utilized in a rational, scientific way, and not swayed by radicalism to the exclusion of remedial measures that will give equally good results. If the average surgeon throughout the country operates upon every case of appendicitis as soon as a diagnosis is made, he will have a death rate of 10 to 20 per cent. depend-

ing upon his skill and surroundings. Any ordinary practitioner should be able to carry out a judicious medical treatment with a much less death rate. The expert surgeon in this line of work can operate on all cases with a death-rate of 2 to 10 per cent. The interval operation with the expert should be about .5 of one per cent. If the average surgeon would limit his work to interval operation and those with severe symptoms within the first forty-eight hours, far more lives would be saved, and much useless surgery avoided.

Dennis, New York (*American Journal of Surgery and Gynecology*), states as follows: "Dr. Richardson reports 574 interval appendectomies with no deaths; the Drs. Mayo, 1,668 interval operations with two deaths. A. C. Bernays, St. Louis, states; 'Mortality in all surgical cases, 8.5 per cent; mortality in expectant treatment, 12 to 16 per cent.'" Dr. R. T. Morris, New York, reports mortality in last 1,000 cases of two per cent.

Dr. J. B. Murphy (*American Journal of the Medical Sciences*) states: "We will admit 80 per cent. of cases recover from attack; that 20 per cent. approximately of the cases either die in the first attack or have recurrences." Dr. Deaver reports a death-rate of two per cent. in surgical treatment of 1,000 cases.

Leube's *Physical Diagnosis*, p. 313: "The great majority of cases (statistics vary, being about 90 per cent.) result in spontaneous recovery."

Boas' *Diseases of Intestines*, p. 499, says: "Sahli, Reavers, Kleinwachter, Rotter, Curschmann, Aufrecht, and others, have brought forward a very impressive material to show the curative results of conservative treatment.

"Sahli collected the entire material of Swiss physicians, thus gathering 7,213 cases. Of these, 473 were operated upon with a mortality of 21 per cent.; 6,740 were treated conservatively with a mortality of 8.8 per cent. Relapses occurred in 20.8 per cent." He also quotes—medically—"Kleinwächter's mortality 7 per cent., Curschmann and Aufrecht 4 to 5 per cent, Rotter 8.9; Renvers only 3 per cent. Surgical statistics vary from 9.6 (Murphy) to 24 per cent. Richardson's average is about 15 per cent. (Later Murphy and Richardson report a lower mortality.) He believes mortality will be decreased by increased experience, early operation, etc., but a mortality of 5 to 8 per cent. will exist in appendicitis, no matter how timely and successfully the operation is performed (Rotter)." Under internal treatment at "St. Hedwig Hospital (Berlin), of 213 cases, Rotler gives death-rate at 8.9 per cent.; Urban Hospital, Berlin, 132 cases, with a mortality of 12 per cent. (Borchardt), but of the 16 that died about 14 were admitted with inoperable general peritonitis." Some investigators report 30 to 40 per cent. of post mortems give evidence of appendicitis during life.

Ochsner has taught us that severe cases can

recover without operation if properly handled. His death rate of 2.2 per cent. in 1,000 cases has demonstrated that surgery is not always essential to recovery, even in cases of perforation or gangrene of the appendix. He also states that "all cases which are diagnosed reasonably early may be carried through any acute attack, no matter what its character may be."

Another evidence of the possibility of nature properly aided handling these cases is the present tendency of many surgeons to advise waiting if the operation is not done within the first forty-eight hours, or while the infection is practically confined to the appendix. This is certainly an admission that surgery is less successful than internal treatment at this stage of the disease, or that nature, after the second day, is better able to take care of the case than the surgeon.

In arriving at our conclusions we must remember that hospital cases are not a correct guide as to results and mortality, neither are those from a consulting surgeon, nor those of the general practitioner, whose work is principally consultation. The mild case, in nearly every instance, is handled by the physician without consultation, or being sent to a hospital; thus it is many mild cases recover without operation.

From my own observation, which I hope is based upon a reasonable amount of discrimination and judgment, I would say that the general practitioner whose death-rate is above two to five per cent. in appendicitis has something wrong in his treatment of these cases. All cases of appendicitis cannot be treated alike any more than all cases of any other disease. Discrimination and judgment must be used in each case. The physician who produces active catharsis in severe cases is as dangerous or more so than the one who gives opiates and coal-tar derivatives in large doses in the first stages. Mild catharsis in properly selected cases in the early stage has its benefits. Opiates in small doses, just sufficient to relieve severe pain or quiet peristalsis after a diagnosis is made, used per rectum or hypodermically, have their advantages in selected cases. Ochsner precludes all food and medicines by mouth; if vomiting is severe, he uses stomach lavage and nourishes patient by rectum, giving predigested foods in small amounts with salt solutions. Large amounts thrown into rectum excite peristalsis, which is to be avoided, especially in severe cases.

Cheyene and Burghard¹ prohibit food by mouth when vomiting is present and allow no solid food until temperature remains normal for several days. They advise salol or naphthaline; they condemn purgatives, allow enemata with caution in some cases to move bowels, object to antipyretics, allow small doses of opiates guardedly in some cases, just sufficient to relieve pain, and state that belladonna and quinine will frequently relieve the pain. All agree to the use of hot or cold applications for the relief of pain.

¹ *Surgical Treatment*, Vol. 6.

As a general line for internal treatment we would suggest the following as worthy of confidence and productive of good results, which will materially lessen the mortality in these cases.

R Carbolic acid.....	aa 3ss
Papoid	
Glycerin	aa ʒi
Listerin	
Ess. Pepsin	g. s. ʒiv

Mix. Sig. One teaspoonful two to four hours.

Alternate with salol-salacin carb. guaiacol aa gr.iii, adding $\frac{1}{8}$ to $\frac{1}{4}$ gr. of calomel.

For a mild case the above acts well, tends to disinfect the alimentary tract, lessens gas formation, quiets the stomach, fortifies nature's resisting powers and aids digestion.

In such a case salines or oil may be given or bowels flushed out in order to remove offending toxic material within first twenty-four hours. If the case is more severe, but without vomiting, and bowels not obstinate, the liquid and capsules may be continued, nourishing patient per rectum. If vomiting with severe symptoms prohibits everything by mouth, wash out stomach and give nourishment by the rectum in small quantities. Keep patient quiet in bed in every case and require use of bedpan. Opiates should be avoided in all cases as much as possible, especially until the question of operation is decided, and then given only in sufficient quantity to relieve pain and quiet peristalsis. The coal-tar derivatives are more treacherous in obscuring symptoms and depressing the patient and should not be used. No doubt our surgical friend is ready to say 'you cannot disinfect the alimentary canal or appendix by internal antiseptics, yet he will scrub his hands with brush, soap and antiseptics for half an hour and not render them sterile, neither can he completely sterilize the field of operation or abscess cavity, and yet he would not fail to use such means. Is not an alimentary canal distended with gas, filled with decomposing material, loaded with germs and toxins, a menace to the patient and more likely to produce unfavorable results and convert a mild into a severe form of infection?

If we cannot disinfect the alimentary canal, destroy the germs or neutralize the toxins, we can partially do so and aid nature in conserving her forces that she may be the better able to build up barriers to the invasion of the infection. The prime object in these cases should be to disinfect so far as possible the alimentary canal, remove toxic material from same when it can be done safely and early, later quieting peristalsis, avoiding drastic cathartics, depressing vitality or obscuring symptoms by opiates or coal-tar derivatives, and sustain the patient in manner least likely to do harm.

In conclusion, let me restate my position:

1. The average surgeon will save more lives by operating only on the severe cases of appendicitis within the first forty-eight hours and those that suddenly grow worse after a few days of

improvement; doing the interval operation on all that do not completely recover from first attack and in relapsing cases.

2. That internal treatment properly conducted should have a death-rate of not over two to five per cent.

3. That the death-rate can be reduced nearest to zero by the average surgeon doing the interval operation on those that do not fully recover or have relapses and operating on the severe cases within the first twenty-four to forty-eight hours and those that suddenly grow worse after a few days of improvement, leaving the remainder of the cases to judicious medical treatment. There is also a field for medical treatment in many cases after appendix has been removed in correcting the original cause of appendicitis or looking after existing complications. The surgeon should not dogmatically assert that appendicitis has no medical treatment, nor decry or exclude judicious medical treatment in these cases; neither should the general practitioner exclude the surgeon, but each should assist the other.

AN ATTEMPT TO ADAPT FOR CLINICAL PURPOSES, THE TESTS FOR ELECTRIC CONDUCTIVITY OF URINE.

BY G. KOLISCHER, M.D.

AND

L. E. SCHMIDT, M.D.,
OF CHICAGO.

THE development of every branch of modern surgery is marked by an endeavor to outline diagnosis, indications and prognosis as definitely and completely as possible, before undertaking the operation; so that, the result may not be marred by the shortcomings of an impromptu decision, during the interference or that the result might be simply left to good chance.

This becomes especially important if we have to deal with organs whose secretory functions are of vital importance. For a good many years the diagnostic methods have tried to keep abreast of the rather rapid development of renal surgery. There was in particular one point which concentrated the most intense attention on itself, that is, the question of the functional capacity of either kidney. In its extreme, this question will read: How are we going to determine previous to the operation whether one kidney will be sufficient to attend to the necessary eliminative process after its mate is removed.

The first preliminary problem was to collect the urine separately from either kidney. This question was solved by the introduction of the segregator and the ureteral catheter into our diagnostic armamentarium.

As to concluding from the examination of this separately collected urine upon the functional capacity of the respective kidney, it was first thought that determining the amount of urea would allow of a satisfactory decision as to the reliability of the kidney. This was very soon

refuted; and it was shown that if a test in such a direction was admissible at all, it necessarily ought to be the determination of the total amount of the solids eliminated during a certain period of time, or to express it in up-to-date language; we have to try to determine the molecular concentration of the specimen. Cryoscopy was received with the greatest enthusiasm as the method that should give infallible results in this direction; but controlling experiments soon proved that the reliability of this method was overrated, then this method was more elaborated by comparing the cryoscopy of the urine with the cryoscopic results in blood examinations; the theory was that in all cases in which both kidneys are considerably diseased, the consequence must be a decided increase of solids contained in the blood, which must lead to pronounced deviation of the freezing-point. But it was shown that cryoscopic results are not only influenced by the mistakes of art that are very likely to occur; but also by conditions under which the patient lived previous to the examination, as exercise, nourishment and so on. It furthermore was shown that a healthy kidney temporarily may be disabled to a certain extent on account of toxin brought into circulation by its diseased mate. In this way a cryoscopical examination carried out in this particular period will lead to misjudging a practically normal kidney. The most adverse and decisive criticism of the reliability of cryoscopical results was offered by Rovsing and Sockman. Without reciting all the details of the argument (we refer to their publications), we want to mention one very important objection that Rovsing makes. He says, that one of the weakest points in the recommendation of this method is that its advocates, *a priori*, accepted their theory as being beyond doubt, consequently they never had a chance of testing it in the converse, that is, they never extirpated a kidney if their cryoscopic results determined the other kidney as being insufficient; but Rovsing did and did it successfully.

Another attempt of determining the functional capacity of the kidneys was made by bringing certain stains into the circulation and watching their appearance in the urine. It was thought that the time that elapses between the administration of the stain and its appearance in the urine and the intensity of this staining would furnish valuable information for determining the functional capacity of the organ. But all this was refuted by Albarran, Barnard, Widai, and Vaquez. And our personal experience coincides with theirs.

Intramuscular injections of indigo-carmin did not help in improving the results in this direction.

Casper and Richter introduced the phloridzin test and claimed that it was absolutely reliable. Rovsing demonstrated in his publication that this method is also unreliable, that Casper never subjected it to the converse tests mentioned above

and furthermore that the phloridzin test cannot be considered free from danger as it demonstrated by one of his own observations and by a report coming from Pielicke.

Finally the test of the electric conductivity of the urine was introduced in order to determine the functional capacity of the kidneys. This latter method is based on the experience that a normally functioning kidney will furnish a urine of higher electric resistance than would a kidney that is diseased. That this method also is not reliable, becomes apparent from the following considerations: We found that in normally individuals, normal kidneys at different times would furnish specimens of varying electric conductivity and that this variation occupied rather wide limits; we found furthermore that two normal kidneys in the same normal individual might furnish specimens of different electric conductivity, although both specimens were collected at the same time. We furthermore observe that one kidney might temporarily be impaired in its function by the presence of an infectious focus in the other kidney, that during this time the electric conductivity of the urine produced by it will be relatively high and that it will sink to a low level after the inflammatory conditions in the other are removed from the system.

In summing up, it may be said that all of the methods so far described meet with the following objections: They are all based upon the assumption that there is a general standard that represents the normal function of the kidney, that any deviation from this accepted standard indicates abnormal condition in the organ and that the degree of this deviation is in proportion with the degree of pathology. But there is not such a general valid standard. Second, none of these methods furnish a possibility of discriminating between a permanently diseased and disabled kidney and a healthy kidney that only temporarily is impaired in its function by the influence of its diseased mate.

We therefore tried to construct a method which is independent of the fallacious assumption of a general standard and which will permit the important discrimination between a permanently diseased kidney and a normal kidney only temporarily reduced in its elimination. We argued that the best way to test an organ would be to test its reaction and resistance toward the extraneous influences; we therefore endeavored to find out whether running a stain through the kidney might not influence the functional capacity of a normal and an abnormal kidney in a different way. As stain we selected indigo-carmin, and as method of testing we selected the test for electric conductivity on account of its extreme sensibility. We outlined the order of the experiments in the following manner: First, it was necessary to find out in what way, if at all, in normal kidneys, the passage of a stain would influence the electric conductivity of the urine produced. Second, it was necessary to find

out whether it would be possible to classify diseased kidneys according to the surgical question—"Can one kidney be relied upon to attend to the necessary elimination after its mate is removed?" The collection of the specimens before and after staining has to be done inside of such a short period of time that the general condition of the individual to be examined remains the same during either collection. In this way, if the expression is permitted, we made each kidney a standard unto itself. In order to get the basis for classifying the kidneys in a surgical sense, we discriminated between diseased kidneys that had produced heart and general symptoms and those that so far had not produced such symptoms. The first class, we considered as still safe in a surgical sense; while the latter were looked upon as absolutely unreliable. The results of our experiments can be summed up as follows:

After the stain appears in their secretion normal kidneys will produce urine of slightly decreased electric conductivity as compared with the conductivity of the specimen collected before the stain was administered. This decrease of conductivity, however, will never exceed nine international ohms. Even if the specimens collected from either kidney at the same time, show a difference in the electric conductivity before the stain was administered, the decrease of the electric conductivity after staining will be exactly the same in either specimen.

Diseased kidneys that according to the above given criterion are considered as still safe, will show in the urine collected after the stain appeared in the urine, a decided increase of electric conductivity compared with the specimen collected before administering the stain. This increase, however, will never exceed twenty international ohms.

Kidneys giving a difference of more than twenty international ohms have to be considered as entirely unsafe in a surgical sense.

A normal kidney temporarily impaired in its eliminating power by the presence of infectious foci in its mate shows the following phenomena: The specimen collected previous to the administration of the stain shows a high electric conductivity; but the decrease of electric conductivity after the administered stain appears in the urine never exceeds nine international ohms. Shortly after the infectious foci are eliminated from the other kidney by appropriate surgical interference, the electric conductivity of the urine furnished by the normal kidney will drop to a lower level and stay there; and again, the difference before and after stain will not exceed nine international ohms.

That this test may be considered a functional one seems to be proven by the fact that if we add indigo-carmin to a specimen in vitro there will be only a very slight change in the conductivity, a slight decrease which will never exceed two international ohms, even if so much indigo-carmin is added that the staining is by

far more intense than in any case in which the stain colored the urine by passing through the kidneys.

STRICTURE OF THE URETHRA: PRELIMINARY NOTE ON A TUNNELED AND GROOVED SOUND AND A TUNNELED AND GROOVED CATHETER FOR DILATATION.

BY VICTOR COX PEDERSEN, A.M., M.D.,

OF NEW YORK;

GENITO-URINARY SURGEON TO THE OUTPATIENT DEPARTMENT OF THE NEW YORK HOSPITAL AND OF THE HUDSON STREET HOSPITAL.

WITHOUT entering into the merits or demerits of dilatation of organic stricture of the urethra as a mode of treatment, more than to say that the present tendency is directly in favor of it, it seems desirable to call attention to a sound which the writer has had in use in dispensary and private practice with the greatest possible success, for the past two and a half years. Research in the library of the Academy of Medicine and among the instrument makers has failed to reveal a sound which embodies all the features of the one to be described. Originality, however, is of far less importance than efficiency and convenience. These have certainly been reached in a most satisfactory manner, if the experience of the writer in genito-urinary work at the Outpatient Departments of the New York and Hudson Street hospitals as well as in private, is a criterion.

The features of the sound are the following, as shown in the outline drawing (Fig. 1):

1. The curve of the sound is of the same radius as the standard urethral sound, but one inch shorter. This decrease in length has been compensated for by an increase of one inch in the length of the shank. The object and advantage of the short curve lie in the fact that there is very much less leverage upon the face of a stricture in a short curve than in a long curve, thus the danger of injuring the filiform and of making false passages in the urethra is greatly decreased.

2. The taper of the curve is uniform from its base to its tip and regularly includes six sizes from No. 12 F. upward. The smallest point of the instrument is made 6 F. for the reason that this is the size of the Maisonneuve instrument. If a stricture is so tight that a 6 F. instrument cannot be engaged therein, other forms of treatment had best be adopted in the majority of cases. The small sizes, therefore, below 12 F. are uniformly at the tip No. 6 F. and regularly taper upward as follows: Two sizes for 8 F., three sizes for 9 F., four sizes for 10 F. and five sizes for 11 F. The uniformity of the taper has the object of rendering the dilatation much more secure on the following grounds: The middle of the curve of the 21 F. sound, for example, is 18 F., while the sizes 19 and 20 F. occur at equal distances between the middle of the curve and the full size of the shank. If, therefore, a No. 20 F. sound has already been passed through the stricture, the beak of a 21 F. sound will be almost entirely through the same stricture before the

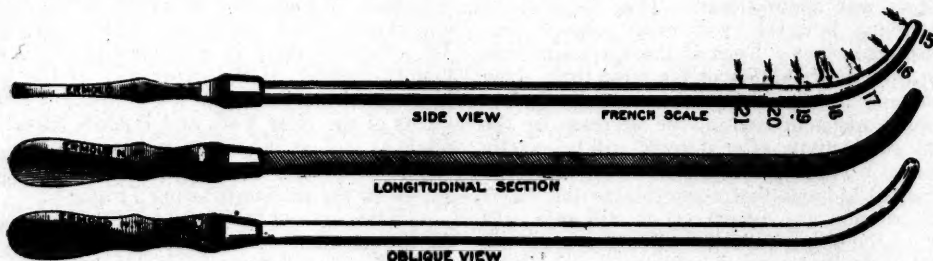
dilating begins. The safety of this plan is obvious and becomes much more important when for any reason the dilating is being done more rapidly than one size at a time.

3. The *tunnel* of the sound is one third larger in diameter than the diameter of a small filiform and is five-eighths of an inch long. These dimensions are uniform throughout the set of sounds, thus securing entire uniformity of action and correcting the mistake in the standard tunneled sound by which the tunnels in the upper sizes are so large as to permit an inconvenient amount of play over the filiform. The length of the tunnel secures the sounds from twisting, buckling, breaking or cutting the filiforms, accidents which are not infrequent in the standard instrument. The length, however, is not sufficient to cause binding of the sound upon the filiform, provided ordinary skill is employed.

4. The *groove* of the sound passes along the shank three quarters of the length thereof, thus insuring ease of testing the freedom of the filiform. The grooves, like the tunnels, are also of

is as follows: After the filiform has been inserted in the usual manner, the 6 F. catheter is passed over the filiform, the bladder, if distended, is partially evacuated through the silver catheter or, if empty, is moderately filled with any mild antiseptic solution, such as boric acid, permanganate of potash, Thiersch or silver nitrate solution. The catheter is then removed, leaving the filiform in situ, and the sounds are taken in order, beginning with 8 F., and gently passed over the filiform through the stricture until that size is reached which the patient states to be moderately painful.

The writer finds that as a rule most strictures may be thus dilated to about 10 F. with very little inconvenience to the patient. The sound is then left in situ for ten or fifteen minutes in order to get the full benefit of the dilatation. After this the filiform and sound are removed and the patient is allowed to evacuate the contents of his bladder. If the contents of the bladder be urine, as in cases of distention, the sound is removed and the filiform is left in place, and the silver



The side view shows the sizes of the curve from 15 F. at the tip to 21 F. at the shank; 18 F. is at the midpoint of the curve. The longitudinal section shows the relation of the tunnel and groove to each other. The oblique view foreshortens the curve and shows the roof of the tunnel, making the first five-eighths inches conical.

the same size and length throughout the set. There is no reason whatever for increasing the width and depth thereof as the size of the sounds advances, thus the inconvenient dipping of the mucous membrane into a wide groove in a large sound is largely corrected and consequent pain to the patient avoided.

5. The tunneled and grooved silver *catheter* alluded to in the title are designed in the same manner, namely: With a short curve of uniform taper of six sizes, a shank one inch longer than the standard, tunnels of uniform diameter, five-eighths of an inch long, and grooves of uniform length, depth and width throughout the series.

6. The *set* which the author has employed consists of a 6 F., 12 F. and 18 F., tunneled and grooved catheter and sounds of all numbers from 8 to 20 F., both inclusive, also 22 and 24 F. The ordinary practitioner can do perfectly good work with catheters 6 and 12 F. and the even numbered sounds from 8 to 20 F., both inclusive. Only the specialist who is certain to encounter difficult cases frequently, needs every size of sound.

7. The *technic* of employing these instruments

catheter is then again passed and the bladder carefully washed with rather hot antiseptic fluid, some of which is left in the bladder to prevent bleeding, such as sometimes occurs when an over-distended bladder is emptied. After four or five days the patient returns for the passing of larger sounds.

Usually in from four to six weeks dilatation is carried to the point where a filiform becomes unnecessary. A very few strictures are so tortuous and deeply-seated that tunneled and grooved sounds 22 and 24 F. should be passed over a filiform before use of the latter is abandoned. The writer has seen one such case in about three years of dispensary work.

This preliminary note is published with the hope that an instrument which has been so very serviceable in the hands of the writer for a long time will prove equally so in the hands of others doing genito-urinary work.

Acknowledgment is hereby made of the obligations conferred by the kindness and interest of the George Er mold Company in making these instruments.

CYSTIC KIDNEY AND LIVER.BY HERMAN A. REQUE, A.B.,
OF CHICAGO, ILL.

(Continued from Page 214.)

The histological findings are as follows:

The lung shows the findings incident to edema and congestion, also small areas of infiltration with round cells, which are partly polymorphonuclear. The heart muscle, spleen, lymph glands and suprarenal bodies show no important changes. The liver was studied in sections taken from seven different places. In several of the sections the liver tissue appears fairly normal; in others are extensive necrotic areas containing cellular detritus, polymorphonuclear leucocytes, extravasated blood, etc. These necrotic areas are surrounded by dense round-cell infiltrations. Hyperemia, fatty changes, compressions and necrosis of liver cells, and other changes are noted. The characteristic features, however, are (1) cysts; (2) an excessive number of bile-ducts; (3) an excessive amount of fibrous tissue. These features are very unequally distributed, some sections containing scarcely any such abnormalities, while in others practically no normal tissue is found. With the exception of the largest the cysts are quite uniformly lined by a cuboidal or somewhat flattened epithelium. Where the cysts are surrounded by necrotic tissue, such as has been described, the cyst-walls are also partially disintegrated and cellular debris, blood-cells, fibrin, polymorphonuclear leucocytes, etc., are found in the cyst contents; otherwise the cysts generally contain no formed elements. The fibrous tissue is partly interlobular, but occurs also as larger masses containing cysts of various sizes, very numerous bile ducts, and here and there small foci of liver parenchyma. The excess of bile-ducts seems to be coordinate with the excess of fibrous tissue. Many of the small ducts show no lumen. Some of the ducts show several layers of epithelial cells and a few have some colloid-like material in the center of the lumen. Many of the ducts show cyst-like dilatations. There seems to be no reasonable doubt that the cysts are developed from abnormally proliferating bile-ducts; they have the same sort of epithelial lining.

The kidneys were studied in sections cut from six different places. There is considerable evidence of inflammatory processes both old and recent. Areas of round-cell infiltration, congestion, hemorrhage, and connective tissue proliferation are found; also some polymorphonuclear leucocytes; in one section a large thrombus. A great deal of sclerotic fibrous tissue is present everywhere, especially in the medulla and in the form of thick bands around the glomeruli, tubules, and cysts. The walls of the blood vessels are thickened. The glomeruli show marked changes. Some are greatly hypertrophied, others show some dilatation of Bowman's capsule, and a great many show sclerotic changes, often appearing simply as

circular hyaline areas, imbedded in dense fibrous tissue or compressed between the walls of the cysts. A few appear normal.

The convoluted tubules are likewise often surrounded by dense fibrous tissue and are much compressed and distorted; but in places are small groups of convoluted tubules with no increase of interstitial tissue between them; these, however, show some degeneration of the epithelium and are considerably dilated.

A quite different appearance is presented by the straight tubules and a few of the convoluted tubules, namely a very extensive proliferation of the tubular epithelium. This is a characteristic feature and presents a variety of appearances. In some areas nearly all the tubules are completely filled with solid masses of epithelial cells and have the appearance of cords and nests of cells surrounded by fibrous tissue. These cell-masses are often much larger in diameter than any normal tubules and often have a very irregular contour with processes of cells extending into the surrounding tissue. Some tubules are lined by several layers of epithelial cells and processes of such cells partly filling the lumen. In some cases the tubules are partly filled with cells, the rest of the lumen being occupied by a homogeneous or somewhat concentrically laminated reddish or bluish-red material resembling colloid; this material seems to be a degeneration product of the epithelium and is also found in some of the smaller cysts, either in diffuse masses or as small rounded bodies like those in the tubules. The cells of the proliferating epithelium stain deeply and the nuclei are often polygonal. In numerous instances dilated tubules and cyst-like spaces contain a single layer of epithelium which is thrown into several folds so as to fill the lumen. In the dense fibrous tissue near the pelvis are numerous very narrow or distorted tubules which, however, show the same signs of proliferative activity. The lining of the pelvis seems to consist of a thick wall of sclerotic fibrous tissue.

Of the cysts the largest ones have no definite epithelial lining; the smaller ones are lined by a somewhat flattened epithelium generally of a single layer of cells. They are generally surrounded by dense, fibrous walls, in which may be found flattened glomeruli and narrow tubules without any lumen. The cyst-contents are variable. Some contain a finely granular material without any formed elements. In others we find blood-cells, polymorphonuclear leucocytes, cell-detritus of various kinds, and the above-mentioned colloid material. In rare instances short, papillary processes are seen extending into the cysts. These processes are generally covered by several layers of epithelial cells; they are found chiefly in the smaller cysts, and in these cases the whole or a part of the cyst-wall may be lined by several layers of epithelial cells, and there may be shreds of epithelium and colloid material in the cyst-contents. Such cysts are found chiefly

in the medulla. In the cortex are found a few cysts without any definite capsules, but surrounded by fairly normal renal tissue; these cysts may be described as irregular spaces having an imperfect lining of flattened cells; they may possibly represent dilated convoluted tubules or glomerular capsules. The fluid in some of the large cysts was examined chemically. It was dark red from admixture with blood. Specific gravity, 1.017. Reaction, alkaline. Albumin very abundant. Urea .22 per cent. by the Doremus method. In the sediment which mainly consists of red cells, a few leucocytes, elongated epithelial cells, and cholesterol crystals were found.

The pancreas appears to be normal, as far as the parenchyma is concerned, except for a few small groups of acini in which the cells are greatly swollen and the nuclei unstained. In the interlobular connective tissue is seen, in a few places, a peculiar development of the ducts. In part there is a great number of very small ducts; in part there are cyst-like spaces which presumably represent enlarged ducts. Some of these spaces are large enough to be seen by the naked eye; one of them measures about 3 x 1 mm. These spaces are partly lined by a high columnar epithelium, which is thrown into numerous folds so as completely to fill the interior of the spaces and also forms single-layered outgrowths of cells extending into the surrounding connective tissue. Only one small block of pancreatic tissue was preserved for examination, and it would perhaps be rather incautious to draw any definite conclusions from so incomplete a study of the organ. Nevertheless, there does seem clearly to be present an abnormal proliferative activity of the epithelium of the ducts somewhat analogous to what has been described in the liver and kidney. Pancreatic cysts have been described as occurring in connection with cystic kidney, and it is possible that they might be formed in an advanced stage of such an epithelial proliferation as is present in this case. Retention cysts might be formed through an occlusion of the ducts by the proliferation of epithelium within them, or the mass of proliferated epithelium and its degeneration products might cause cystic dilatation of the ducts.

Case II.—Miss M. V., aged nineteen years, died at the Cook Co. Hospital in August, 1902. The clinical diagnosis was typhoid hemorrhage and suspected tumor of the left kidney. The history is very meager. The young woman had the "diseases of childhood." She menstruated at sixteen, thereafter very irregularly, at one time ceasing for six months. At time of admission a hard, resistant mass, which was not tender on pressure, was palpable in the left iliac region. She was a rather small woman, but fairly well nourished.

Autopsy was held by Dr. L. M. Loeb and revealed the usual changes of typhoid fever and,

in addition, bilateral cystic kidney, bilateral ureteral dilatation, distended bladder with small urethral orifice, and arteriosclerosis. The necropsy record gives the following description of the kidneys:

"The left kidney weighs 750 gms. and measures 19 x 9 x 7 cm. Its capsule strips with difficulty, leaving a surface composed of pea to walnut-sized cysts and islands of kidney tissue. On section the organ is found full of these same cysts. In the upper pole is a soft, pulpy area, 1½ cm. in diameter, which is encapsulated by a membrane. The cysts on section are found to contain a thin fluid or a yellowish, semi-solid substance. The right kidney weighs 640 gms., measures 16 x 8 x 7 cm. and presents the same condition as the left."

"The ureters are distended to the size of a lead pencil."

To the description of the kidneys may be added that all the customary markings are obliterated, there is no distinction between cortex and medulla, the pelvis is encroached upon by cysts, the partitions between many of the cysts are thin as tissue paper, often two or more cysts are only partially separated by remnants of walls, and the specimen may well be regarded as a typical example of total cystic degeneration.

The histological examination of the organs showed the usual changes of typhoid fever. The kidneys were not submitted to any special study at that time. The present histological study reveals the following:

Sections taken from four different parts of the kidneys show only slight evidence of any recent inflammation. One section contains an abscess about .5 cm. in diameter. There are also a few small areas of round-cell infiltration, considerable congestion and circumscribed areas of hemorrhage. In the cortex there are islands of fairly normal renal tissue, but the convoluted tubules generally show some degeneration of the epithelium, and there is an excess of fibrous tissue. In the medulla scarcely any normal tissue can be found, but nearly everywhere a great deal of connective tissue with large, oval nuclei, presenting often an appearance as if all the specific tissues had been reduced to a mass of indifferent, "structureless" tissue. There is also in the medulla, particularly in the region bordering on the pelvis, a great deal of more or less sclerotic tissue and a small amount of adipose tissue.

Of the glomeruli many appear normal. Many are greatly hypertrophied. Others have dilated capsule spaces, the glomeruli themselves in these cases often presenting a shrunken appearance. Some which are nearer the medulla have very irregular shapes, no definite capsules, and in some instances can scarcely be distinguished from the mass of embryonal tissue which surrounds them. Marked sclerotic changes in the glomeruli are not so frequent as in Case I. The tubules show essentially the same changes as in Case I: consider-

erable dilatation of the convoluted tubules; a striking epithelial proliferation, especially in the straight tubules, with formation of solid processes of epithelium within the tubules or extending into the interstitial tissue; compact masses of epithelium, some of which show a central degeneration suggestive of beginning cyst-formation; in the region of the papillae mainly very narrow, or compressed and distorted, tubules, which, however, also show evidence of epithelial proliferation.

The cysts resemble those in Case I. The fibrous bands surrounding them are often very thick, and in these bands may be found a great many very slender tubules, generally with a very small, if any, lumen; these tubules often run parallel with the cyst-wall. Some larger, distorted tubules and a few flattened glomeruli are also found in the intercystic tissue; occasionally some normal renal tissue. In only one instance was anything resembling a glomerulus found within a cyst.

The two cases described are, I think, practically identical as far as the kidneys are concerned, or at least similar enough to be explained on a common basis. In reviewing the findings and seeking the primary cause of the cystic degeneration we have to consider chiefly the following possibilities: (1) Both cases show evidences of old (and recent) inflammatory processes, resulting in the production of a great excess of interstitial tissue and sclerotic degeneration, in the kidneys and in Case I also in the liver. These changes may have obstructed the excretory apparatus so as to produce retention cysts. The epithelial proliferation might then be regarded mainly as a secondary effort at regeneration or repair. (2) The epithelial proliferation may be regarded as primary and may then have produced cysts, partly by obstructing the tubules of the kidney and the bile ducts of the liver, thus causing retention of secretion, partly by the "hollowing out" of masses of proliferated epithelium and new-formed tubules and ducts. These cases would then correspond to the cyst-adenomas of Nauwerck and Hufschmied, Von Kahlden and others, and the interstitial changes might be regarded as secondary, probably due to an intercurrent inflammatory process, such as was plainly present in the liver of Case I at the time of death. (3) The malformation theory in one of its many forms might perhaps be adjusted to fit these cases. We have no evidence of any definite maldevelopment. We do have an excessive amount both of connective tissue and epithelium, the presence of which we might, with Borst, ascribe to an incoordinate development of the hypoblastic and mesoblastic elementary tissues, or, adopting Still's view, regard as the remains of embryonal elements that did not become properly differentiated.

Of these possible explanations I am inclined to adopt the second. The difficulty of differentiating, in some cases, between true neoplastic

growths, as adenomas, and regenerative or hyperplastic growths is well known. However, in these cases, it is quite evident that an abnormal proliferation of epithelium is present, such as, I think, is unknown in ordinary inflammatory processes, and the belief that it has had a share, at least, in the production of cysts is, in view of the findings described, not without foundation.

*Case III.*¹—These large and typical cystic kidneys were found in the body of a woman, forty-five years old, who was admitted comatose to the homeopathic service of the Cook County Hospital and died in a few hours, the diagnosis being uremia. The heart was enlarged, but there was no valvular lesion. Microscopically we note that the large cysts have dense fibrous walls with an imperfect lining of flat cells and in the contents are many colloid masses. The smaller cysts have a regular lining of short columnar cells with deeply stained nuclei; the cells may be several layers deep and there are frequent papillary outgrowths covered with one or more layers of cells and there are also masses of cells pushing out into the intercystic tissue. The smaller cysts also contain lamellated as well as coarsely granular masses. The intercystic tissue contains tubules with irregular, granular cells, with cells that have undergone colloid change, and with colloid masses. There are also fibrous, atrophic, and enlarged glomeruli. The vessels are greatly thickened in the intima and there is much increase in the connective tissue with a diffuse round-cell infiltration and small, hemorrhagic foci. The cortex and the medulla show essentially the same changes. Occasionally we come upon islands of cells in the intercystic tissue that are independent of cysts, have nuclei with much chromatin, the cells being sometimes arranged in a circle as though to form a cyst. This brief summary indicates two processes—a progressive formation of cysts as in cystadenoma elsewhere and a chronic and acute interstitial nephritis in the intercystic renal remnants.

Case IV.—The patient was a middle-aged woman who for years complained of a swelling in the region of the liver and finally died suddenly from a cerebral hemorrhage. The kidneys are very large and polycystic, many of the cavities being large enough to hold 100 c.c. or more. The liver was also converted into a mass of large and small cysts. The heart was hypertrophied and the cerebral vessels were sclerotic. Microscopically we find in the kidney similar papilliferous projections covered with epithelial cells as in the previous case, but not so numerous nor so well marked, and the tissue between the cysts contains more dense homogeneous fibrous tissue and less of the renal parenchyma proper. There are foci of intense round-cell infiltration present, however. The liver was kept for some time in carbolic acid and thus rendered unfit for

¹ For Cases III, IV and V, I am indebted to Prof. Hektoen. They were studied by him, and by his kind permission his notes were used as the source from which this description of the cases was obtained.

microscopical study. It is now in the museum of Rush College, but parts have been removed. It contains cysts varying in size from that of a pea or smaller to that of an orange. A few large cysts project from the surface; in other places the surface is smooth or slightly puckered. On a cut section about one-half of the total area is occupied by cysts. Some of the large cysts are separated only by thin fibrous walls; again there may be areas of several square inches almost free from cysts. The cysts seem to be somewhat less numerous near the upper surface than elsewhere.

Case V.—Man, colored, aged fifty-seven years, who had syphilis in 1856, died July 25, 1893, with heart hypertrophy, edema and ascites, large double inguinal and umbilical herniæ. The urine was albuminous, of low specific gravity, and contained granular and hyaline casts. He traced his illness back for five months and said that it commenced with pain in the abdomen and edema of the face and legs. The post mortem was made by Dr. Hessert; there was edema, ascites, hydrothorax, and the herniæ mentioned. The heart weighed 480 grams; there was some sclerosis in the coronaries and in the aortic and mitral valves, but there was no valvular deformity. The conjoint weight of the kidneys is 2,320 gms.; the measurements, 20 x 9.5 x 9 cm. The surface is thickly studded with cysts of varying sizes, some of which have translucent, others dark-colored contents. On the cut surface all parts of both kidneys are cystic, the largest cysts being perhaps the size of a hen's egg. In some of the cysts is a dark, granular sediment. Both pelves seem normal. The ureters are patent. The microscopic sections from this case show that there are papillary outgrowths into cysts covered with short cells and also masses of cells pushing into the cyst-wall, but the changes are not so marked as in Case III, while the increase in the connective tissue in the parenchyma is very marked and the round-cell infiltration very pronounced.

Case VI.—Dr. Bassoe has furnished me with notes concerning a case which he observed in the Cook County Hospital while an interne in the service of Dr. Arthur R. Edwards. The patient, an Irish laborer, forty-four years old, was admitted to the hospital on July 13, 1897. He died two days after admission, during an attack of epileptiform convulsions.

Personal History.—No venereal diseases; excessive use of alcohol; smoked and chewed tobacco. The patient sought admission to the hospital on account of difficulty in breathing, which commenced one week before admission; no other symptoms except some substernal soreness.

Physical Examination.—The patient is mentally dull. The tongue is parched, rough, and coated brown. The breath is foul. The veins of the forehead are distended. The nares are dilated. The pulse is full, slow, and regular.

Breathing is labored, expiration accompanied by wheezing sounds. The arteries are sclerosed. The chest is somewhat barrel-shaped, moves as a whole, and the accessory muscles are in play; the supra- and infraclavicular fossæ are filled, and the lower intercostal spaces are retracted in inspiration. The lungs are hyperresonant, fremitus is diminished, breath sounds are harsh, expiration prolonged and accompanied by sibilant and whistling râles. The area of dullness over the heart is almost obliterated; heart sounds are distinct and apparently clear. The abdomen is slightly tympanitic; no areas of dullness or tenderness. The upper border of the liver is at the seventh rib in the mammary line, the lower border two finger-breadths below the costal arch. The spleen is not palpable. There is a small umbilical hernia. A scar exists as evidence of an old lesion of the upper third of the left tibia. There is slight edema of the lower extremities. Lymphatic glands and genitalia are negative. The skin is dry and harsh; there is a bruised area over the left hip. The urine is of a light straw color, reaction alkaline, specific gravity 1.010, contains a trace of albumin, no sugar. Autopsy was held by Dr. Cook. The anatomic diagnosis was as follows:

Pulmonary edema with emphysema; adhesive pleuritis (slight); cardiac hypertrophy and dilatation; cystic degeneration of kidneys; calcification of peribronchial glands; double hydrothorax.

The autopsy record contains the following description of the organs:

The abdominal cavity contains a small amount of clear fluid; the peritoneum shows no changes. The pleural cavities contain considerable quantities of a clear reddish-yellow fluid, without any flocculi. The right pleural cavity is partly obliterated by old adhesions; the apex is free. The anterior borders of the lungs approach each other and almost obliterate the precordial space.

The pericardium is smooth; the pericardial cavity contains a small amount of clear fluid.

The mucous membrane of the larynx and trachea is smooth and is covered with a small amount of mucus. The right lung weighs 1,000 gms., the left 1,020 gms. The surface of the left lung is smooth and of a grayish-red color; its anterior edges are emphysematous; it crepitates throughout. The cut section has a uniform dark-red color in the lower portions, light, almost scarlet, in the upper portions. A large amount of frothy reddish fluid can be expressed. The right lung shows a few old adhesions over the anteromedian aspect; on the posterolateral surface, in the lower lobe, is a calcareous nodule of the size of a filbert, just beneath the pleura. Otherwise this lung is like the left. The apices of both are negative. The peribronchial glands are calcareous and pigmented. The heart weighs 410 gms., and is a little larger than the owner's fist. The left ventricle is 6 cm. long and its wall is 1½ to 1¾ cm. thick. The right ventricle is 11 cm. long

and its wall 5 mm. thick. The valves show no changes. The left ventricle contains a goose-fat clot. The mitral orifice readily admits four, the tricuspid eight fingertips. The myocardium is fairly firm and of a uniform reddish brown color.

The aorta shows a few calcareous plaques about the coronary orifices and in the arch.

The spleen measures $15 \times 10.5 \times 2$ cm. and is rather soft.

The right kidney weighs 630 gms. and measures $16.5 \times 10 \times 5$ cm., the left weighs 610 gms. and measures $17 \times 9 \times 5$ cm. The surface of both kidneys is rough and is the seat of numerous cysts ranging in size from that of a pin-head to that of a filbert. One cyst of the size of a small hickorynut contains a puriform material, the others contain a clear fluid. The cut sections show both kidneys to be honeycombed with cysts; there is no distinction between cortex and medulla; there is no evidence of pyelitis. The ureters are negative, likewise the bladder.

The liver weighs 1,950 gms. Its measurements are $28 \times 22 \times 20 \times 6.5$ cm. It has a smooth surface and cut sections present a uniform brownish red color; the lobular markings are indistinct. The gall-bladder contains dark bile and no calculi.

The stomach shows no changes.

The appendix is 4.5 ins. long and lies posterior to the colon, ascending to within 1.5 ins. of the liver.

No further records of this case are available. The only symptom pointing to uremia in this case was the dyspnea. This again calls our attention to the difficulty of diagnosing cystic kidney clinically. In attempting to make a diagnosis the following points have been emphasized by various writers as requiring chief consideration. (For fuller references see articles by Hektoen and Dunger). (1) The presence of a solid or slightly fluctuating, perhaps nodular, tumor in the region of one or both of the kidneys. There may also be prominences on the liver border. If the tumor has existed for many years and there is no history of previous inflammations it is very suggestive, especially if the tumor is bilateral. Malignant growths, inflammatory swellings and other more or less solid tumors must be excluded. Deformity of the abdomen, consisting chiefly in an increase in the anteroposterior diameter of the hypochondriac region (Dunger), may be included under this heading. (2) The clinical course. This may be one of chronic nephritis extending over years, as in our first case. Decrease in the elimination of urea is not always found; there may be blood, pus and albumin. Uremic symptoms may exist for some time, or coma and death may come on suddenly as in many of our cases. Cardiovascular changes and death from cerebral apoplexy are frequent. Intercurrent affections may end life before any definite symptoms of kidney disease have developed. (3) Aspiration of fluid contents of the

kidney tumor and the finding of certain minute laminated or rosette-like bodies of yellowish color and colloid consistency. These may also appear in the urine. Their presence is considered pathognomonic (Dunger), but they have not been found in all cases and even when they are present repeated aspirations and urinary examinations may fail to reveal them. (4) Family history. This has already been dwelt on. If, in our first case, an autopsy had been performed on the body of the sister who died some years earlier with similar symptoms, and the autopsy had discovered the presence of cystic kidneys, the hereditary character of the condition might have led to a probable diagnosis of cystic kidney in the surviving sister.

*Case VII.*¹—J. S., an apparently young man, was admitted comatose to the Cook County Hospital in February, 1905, and died on the day after admission. No history was obtained. A specimen of urine contained sugar and di-acetic acid. Autopsy was held by Dr. Hall, and the anatomic diagnosis was as follows: Parenchymatous nephritis of the left kidney; congenital cystic right kidney; tumor of the head of the pancreas; healed tuberculosis of the upper lobe of the left lung; healed tubercles in the spleen; atheroma of the aorta; sclerosis of the mitral leaflets; edema of the lower lobes of both lungs. The small tumor of the pancreas is found microscopically to consist of minute fibroid and encapsulated caseous tubercles and parenchymatous tissue in a state of degeneration. The left kidney weighs 200 gms.; its cortex is pale and the glomeruli indistinct; there is a small amount of fat in the pelvis. Microscopically this kidney shows marked parenchymatous degeneration.

The right kidney is small; it measures $7.5 \times 5 \times 2.5$ cm. and weighs 52 gms. The normal markings are absent. The interior consists chiefly of cysts, about thirty in number, varying in size from that of a pea to that of a walnut, and separated by thin walls; many of these cavities communicate with the pelvis, which is large and rounded. There appears to be scarcely any renal tissue proper between the cysts. The cortex is reduced to a mere shell from one to four mms. in thickness. The ureter is patent, but very narrow; the blood-vessels are very small. Microscopically the cyst-walls and the small amount of intercystic tissue are found to be of a fibrous character. In the thin cortex are a great number of glomeruli, nearly all of which are reduced to fibrous, often hyaline spots; those not so altered have thick, fibrous capsules. The rest of the cortex consists chiefly of fibrous tissue, in which we find a few atrophic tubules which are generally very small and distorted. The proliferation of tubular epithelium, which was so marked a feature in most of the other cases which have been described, is almost absent in this case. However, here and there may be seen

¹ The material for the study of this case was obtained through the kindness of Dr. Hall, Resident Pathologist of the Cook County Hospital.

a tubule somewhat wider than normal, of irregular contour, and with deeply staining cells, which may fill the lumen. The microscope reveals no cysts, in the sections studied, that were not plainly visible to the naked eye, with a single exception, viz., a round, encapsulated space two or three times as large as an average glomerulus. The interior of this space is almost filled with slender papillary processes carrying large, deeply stained cells. With this exception there is nothing that suggests a progressive formation of cysts going on at the time of death. Some diffuse round-cell infiltration is present.

It will be seen that the cystic kidney in this case presents in some respects a contrast to those previously described; it is small, unilateral, and the proliferation of tubular epithelium, which we regarded as an important factor in the cyst-formation in the other cases, is here almost absent. Whether the degenerative processes were originally the same and were later followed by cirrhotic contraction and cessation of active cyst-formation, or we have here to deal with processes of a different nature, perhaps inflammatory or developmental, is a question not easily answered.

In conclusion, I wish hereby to acknowledge my indebtedness to Dr. P. Bassoe for his kindly help and advice in the preparation of this report.

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ADDRESS.

ON ASCENDING CURRENTS IN MUCOUS CANALS AND GLAND DUCTS AND THEIR INFLUENCE ON INFECTION: A STUDY IN SURGICAL PATHOLOGY.¹

BY C. J. BOND, F.R.C.S.,

HONORARY SURGEON, LEICESTER INFIRMARY.

MR. PRESIDENT, LADIES, AND GENTLEMEN.—I propose, in using the opportunity now afforded me, to depart somewhat from usual custom, and instead of attempting a retrospect of recent surgical triumphs, and of advances in surgical technic, I would rather try to throw the searchlight of inquiry in the other direction,

¹ Abstract of Address in Surgery, delivered at the seventy-third annual meeting of the British Medical Association, July 24, 25 and 26, 1905.

² Courtesy of British Medical Journal.

and indicate some of the ways in which these surgical triumphs may themselves throw light upon physiological and pathological problems, and in this way enable surgery in some slight degree to repay something of the debt she owes to these two foundations of her existence.

For when we come to consider the enormous number of what are really human physiological and pathological experiments, which are performed daily for necessary and well-defined surgical objects and to save life; when we reflect on the great opportunities which the continuous observation of these operation cases affords of looking into the inner processes of bodily function, both healthy and diseased, we are bound to inquire whether we, as surgeons, have in this respect carefully observed all that we might have done, and whether we have utilized to the utmost our many opportunities.

Thus, to come closely to the matter of my remarks to-day:

The Large Intestine.—Consider for a moment the very frequent, nay the daily establishment, of fistula for surgical purposes.

The operations of colotomy, cholecystotomy, nephrotomy, cystotomy, with the resulting fistulous openings into bowel, gall-bladder, kidney, and urinary bladder, should enable us, if rightly studied, to observe something of what goes on in the hollow viscera, the biliary canals, and the urinary tract, when the fecal stream or the biliary or urinary flow is wholly or partially diverted from its normal course.

We will consider the fistulous opening in the bowel, established by the operation of colotomy, first. I have in several of these cases tried to ascertain what occurs in the bowel below the colotomy opening by means of the introduction of some insoluble, innocuous pigment, such as hollow suppositories, containing a few grains of sterilized indigo or carmine, and will record the results in several cases.

Case I.—Cancer of the sigmoid colon with obstruction. About six inches of the bowel was removed with the growth, and partial end-to-end anastomosis performed; but, owing to the patient's condition from obstruction, a colotomy anus was also established. A week later, after recovery, a carmine suppository was introduced into the rectum. A white gauze plug inserted into the lower colotomy opening showed distinct carmine coloration within twenty-four hours, and this color continued to be noticeable for several days after the suppositories were discontinued.

Case II.—The second case was one of advanced cancer, with almost complete obstruction high up in the rectum. Here again, after inguinal colotomy, an indigo suppository placed within the rectum was followed by the appearance of indigo at the colotomy lower opening within twenty-four hours. Here the indigo had passed through the malignant stricture.

Case III.—Inguinal colotomy for cancer of the rectum, with ulceration into the vagina. A suppository containing powdered sterilized litmus was introduced into the rectum on Nov. 28, at 8 P.M. The bowels were moved through the upper colotomy, opening on Nov. 29 and 30, and on the 30th the white gauze plug in the lower colotomy opening was stained blue; the blue color turned red on the addition of acid, thus showing not only that the litmus had traversed the sigmoid flexure, through the stricture, from the rectum, but also demonstrating that the intestinal mucus, and the secretion of the large intestine is alkaline in the absence of fecal matter.

Case IV.—This case is of peculiar interest. An operation for acute appendicitis with abscess, six months

previously, had resulted in a fistulous opening into the cecum, which discharged a very little feces in the right iliac region when the patient assumed the upright position. While recumbent practically the whole of the feces was passed per anum. Before closing the fistula indigo suppositories were administered twice daily on Dec. 12, 13 and 14. Distinct evidence of indigo from the cecal fistula appeared on Dec. 15, the bowels having been moved freely on Dec. 13, 14 and 15, and an aperient taken by the mouth on Dec. 12 and 14. In this case the particles of indigo traversed the whole length of the large intestine within at most three days, and during the time that the natural downward passage of fecal matter was going on, and in spite of the active clearing of the bowel on two occasions by aperients.

From these cases we learn:

First, that in the large intestine, in cases in which the fecal stream has been diverted by a previous colotomy, there is an upward current capable of carrying foreign particles such as powdered indigo along the bowel, and taking about twenty-four hours to pass from the anus through the sigmoid flexure to the colotomy opening. The shortest time recorded has been twelve hours.

Secondly, that this current is not arrested by the presence of a stricture in the rectum, provided that there is, of course, some patency of channel left.

Thirdly, from the case of the girl with the cecal fistula, we learn that it is not essential for this upward current that the fecal current should be wholly diverted or absent, or that the bowel should be prevented from undergoing brisk downward peristalsis, the effect of an aperient.

Fourthly, from the same case, we learn that this ascending current takes about three days to pass from the anus along the whole length of the large intestine to the cecum.

In offering any explanation as to the means by which this upward carriage of pigment particles is brought about we must remember:

1. That in the case of the indigo, at any rate, the particles are insoluble in the intestinal juices. Indigo, administered by the mouth, is recovered, unchanged, as far as microscopic appearance goes, from the feces, so that the material is conveyed in particulate masses, probably by a mucous stream, and not by the agency of phagocytes or wandering cells.

2. Also the current is absent in the dead bowel, and is not due to capillary flow in a closed tube. If, for instance, indigo is inserted into the lower end of a portion of sheep's colon, removed after death, no ascent of the powder occurs in the tube.

3. Further, even in healthy animals, in the absence of any fistulous opening there is some upward flow, though slight, along the bowel. Indigo, inserted into the rectum of a guinea-pig, may be found when the animal is killed, forty-eight hours later, in the feces higher up the colon.

4. Also, the current is quickened by any influence, such as the administration of an aperient, which acts by increasing peristalsis, or, very possibly, by increasing the secretion of mucus. This was shown in the last case.

In fact, a consideration of the facts strongly suggests the explanation that particles of indigo, etc., are carried up the bowel by a mucus current, and that, while there is a central downward current of solid or semi-solid feces, caused by peristaltic contraction, there is going on at the same time, intermittently, or possibly alternating with the downward

peristalsis, an upward peripheral mucus stream, covering and hugging the intestinal mucous membrane, and capable of conveying minute particles only along with it.

Some sort of upward intestinal current has been suspected in the large bowel, and hypothetically spoken of as due to reversal of the peristaltic wave. This is an unlikely explanation from the facts mentioned above—that it is present while the downward peristalsis is going on at its normal rate, and also when the bowel is quite empty of any feces at all.

I venture to think that these facts have a not unimportant bearing on the physiology of a large intestine. By means of such an upward stream the nutritious fluids and particles which are being absorbed out of, or squeezed out of, the gradually solidifying and hardening feces, as they traverse the colon, are carried gently upwards into the emptying upper reaches of the bowel, and are presented to the free mucous membrane for readier absorption. They, too, have a direct bearing on therapeutics and on the administration of enemata, both nutritive and purgative.

The Female Generative Tract.—We now pass to the consideration of the female generative canal. Here surgical operations on the Fallopian tubes have afforded opportunities for careful observation.

In a considerable number of cases during the last two years in which it appeared likely that operation would become necessary on the appendages, after the preliminary douche a little colored pigment—in most cases purified and sterilized indigo, in a few carmine—has been either placed upon or inserted just within the os uteri at varying periods up to twenty hours before operation. Careful microscopical examination of the contents of the Fallopian tubes in these cases has nearly always shown the presence of indigo or carmine particles, while in several cases the pigment has been found on the peritoneal surfaces of the broad ligament, mesosalpinx, and the fimbriae of the Fallopian tubes. This shows that the particles are carried from the os uteri below, right through the uterus and the Fallopian tubes, to the peritoneal sac around the ovary above.

In the case of these pigment particles, automobility (such as the spermatozoa possess) is of course out of the question, and we must fall back on ciliary action, or an ascending mucous stream along the contiguous walls of the mucous canal.

Before, however, we enter on any explanation, it will be well to analyze the results more fully.

Thus in 22 cases in which careful examination was made of the contents of the Fallopian tubes and peritoneum for the presence of indigo introduced into the os uteri at periods up to within twenty hours before operation, there were only four in which no pigment was found.

Of these four cases one was a case of double hydrosalpinx, in which any connection with the uterine cavity was difficult or obliterated.

In one the indigo had been inserted only sixteen hours before operation.

In two cases the indigo was inserted on the first day of the establishment of the menstrual flow, and probably failed to enter the uterus.

On the other hand, positive results were obtained in three cases of double pyosalpinx. In one case of uterine fibroid and in two cases of tubal pregnancy in which rupture or tubal abortion had occurred. One of these is interesting from the fact that the remaining left ovary and tube had been removed two

years previously. The indigo was found in the bloody mucus contents of the tube on the uterine side of the rupture and in the blood filling the conception cavity.

Indigo was also found in two cases of chronic appendage disease, in which the indigo was inserted on the last day of the menstrual period, and in two cases of hysterectomy, which are of special interest. In one the patient was seventy years old, and therefore the uterus was senile. In the other the uterus was removed some months after the artificial menopause produced by oöphorectomy twelve months before. These two cases clearly show that this upward mucous stream is not dependent on the functional activity of the uterus, since it occurs in the senile and post-climateric organ as well as in the actively functional state.

In two cases of large ovarian cysts pigment granules were found on the peritoneum, and in the contents of the tube dilated and stretched over the cyst wall.

In the case of suppurating ovarian cyst with pyosalpinx indigo was found in the pus in the tube. It was also found in three cases of chronic inflammatory disease of the appendages; probably gonorrheal in origin.

In one case of large pyosalpinx and ovarian abscess on one side and hemosalpinx on the other, operation became necessary while the temperature was 104° F., and twenty-eight hours before operation pus began to escape from the uterus. Indigo was found in the bloody contents of the left tube, but not in the pus in the right tube, or that of the ovarian abscess. No doubt the particles were washed away from the uterine opening of the right tube by the flow of matter from the opening.

I desire also to draw attention to the presence of the indigo within the pus cells in one of the two cases of pyosalpinx. The granules were actually ingested by the cells, and lay scattered as blue pigment grains in their interior. In fact, we had succeeded in feeding the pus cells with indigo, and had produced an intravital staining.

Two explanations are possible: Either the material had entered the blood, or lymph stream, and had been ingested by leucocytes or phagocytes, which had then migrated into the abscess, or the pus cells had ingested the granules *in situ* in the abscess, after the pigment had been carried thither up the Fallopian tube. This will, I believe, prove to be the true explanation, and also carries with it the interesting fact that pus cells, as such, after their entry into an abscess are capable of ingesting foreign particles into their interior.

In the other three cases of double pyosalpinx examined indigo was found in the pus in the tubes, but not in the cells. Now, in these cases there was no manifest discharge of matter from the uterus, though the presence of the indigo in the tubes proves that the communication between the tubes and the uterus was still patent. In fact, I believe that this is the case in most, if not all, cases of pyosalpinx. Blocking, temporary and intermittent, no doubt occurs of the lumen of the tube on the uterine side, but bearing in mind how difficult it is, even by operation, to obliterate the channel by any means, short of excision. I think it very probable that some communication exists in most of these cases of secondary infection of tubes with purulent contents, and that an occasional slight escape of pus occurs, with corresponding relief of intra tubal tension.

In fact, the whole subject of tubal regurgitation of uterine contents is very interesting. We know from

the artificial production of hydrometra and hydrosalpinx in animals, under aseptic conditions, that regurgitation of the hydrometric fluid from the distended uterus is much prevented by the sudden deviation of direction which the tube takes in passing through the uterine muscular wall. At the same time, no opposition is encountered by the mobile spermatozoa in their upward passage. As we also now know, from the observations I have just described, that foreign particles of a suitable size, if introduced into the vagina, are habitually carried up the whole length of the genital canal in women. It is not absolutely necessary that the indigo should be inserted into the cervix, for, if deposited in the upper vaginal vault, it is still found occasionally in the tubes at the operation.

The question of the size of the particles is an important one. Particles up to the size of lycopodium grains are carried up, but this seems to be about the limit, as I have found lycopodium (a very few grains) in one case only.

This same upward current exists also in animals, for I have repeatedly found indigo particles in the Fallopian tubes of rabbits after insertion of the powder in the vagina.

I wish also to record an observation at this point on the question of mucus currents in the oviduct of birds. After dusting indigo on the cloacal opening, or after insertion of the powder within the cloaca in fowls, the pigment was found, not only upon, but also sparingly incorporated in, the egg-shell, and I have seen it in the Viteline membrane, thus showing that it had passed up the oviduct. Further observations are necessary to ascertain whether this occurs only at certain periods or throughout the egg-laying period.

I feel sure, however, from repeated observations during intra-abdominal inspection of the fimbriated ends of the Fallopian tubes during the menstrual period, that regurgitation of menstrual blood and mucus occasionally occurs from the abdominal ostium of the tubes; moreover, blood is sometimes found free in the pelvic cavity without symptoms and apart from any question of tubal pregnancy. In fact, I have no doubt that in many cases of dysmenorrhea in young women the pain is really tubal in origin, and is due to peristalsis of the tube in its effort to overcome this regurgitant wave. The pain, in fact, is due to tubal, not uterine colic.

Let us for a moment consider one other important fact, depending on the establishment of the presence of this upward, utero-tubal, mucus current. Those who are brought in contact with uterine cases know that gonorrheal and puerperal poisons, although the most important, do not exhaust all the sources of tubal and peritoneal infection.

The mere exposure of the upper vaginal tract to dirt, to lotions and ointments, to any substance surgically unclean, by whatever means introduced, has in many cases originated the salpingitis and chronic endometritis, and I am not without hope that this picture of the constant upward mucus-current which I have described may produce a greater sense of responsibility in surgeons, and tend, perhaps, to check some of the indiscriminate curetting operations which are so fashionable, and which (while the only treatment in some cases) in others only aggravate the troubles they are supposed to cure.

Fortunately the door, though open, is guarded by the watchful peritoneum. Foreign particles and fluids introduced, as it were, guttatum, by the tiny canal of

the tube, if not too virulent, are at once incarcerated and rendered innocuous. But it should surely make us all most careful to know that any powdered substance we introduce into the os uteri will probably be found, within twenty hours, inside the peritoneal cavity.

The Upper Intestinal Tract.—I shall say a few words later about the means whereby this current is brought about; meanwhile, we pass to the consideration of the upper intestinal tract and the mucous ducts of the glands opening into it.

The gall-bladder is the viscus which, owing to its frequent exploration and drainage for surgical purposes, is specially adapted for investigation on these lines.

I have examined the bile in several cases of gall-bladder fistula following the removal of gall-stones, systematically and daily, for varying periods, indigo being administered by the mouth in cachets containing about 5 gr. during the same period. The bile collected from the fistula is allowed to deposit a sediment, which is examined microscopically, and, in some cases, centrifugalized.

The indigo thus administered by the mouth makes its appearance in the feces about forty-eight hours later, and colors them a dirty or slaty-blue color, which on microscopic examination is found to be due to indigo grains in masses. This shows that most of the indigo passes unchanged, by gastric, pancreatic, or intestinal digestion, through the alimentary canal.

The following are the details for cases examined:

Cholecystotomy for gall-stones and drainage, Nov.

8. On Nov. 20—twelve days after the operation—the patient commenced taking indigo, 5 gr. twice daily for one week. Indigo was found in the bile from the fistula two days after taking the drug.

Cholecystotomy for gall-stones and drainage of gall-bladder on Dec. 1. Indigo was administered on Dec. 5, and on Dec. 7—two days later—indigo granules were found in the bile from the fistula.

Cholecystotomy for distended gall-bladder containing clear bile-free mucus, due to the impaction of a gall-stone in the cystic duct. In this case indigo was commenced four days before the operation. None, however, was found after careful search in the bile-free mucus obtained from the gall-bladder at the operation, or in the bile obtained from the fistula two days later. On Dec. 27, however—six days later—while the patient was still taking indigo, and some 6 oz. of bile and mucus were escaping daily from the fistula, indigo granules were freely found in the mucus coating the wick of white sterile gauze in the fistula, and in the bile collected in the bottle and flowing from the fistula.

Cholecystotomy.—Indigo administered four days before operation. Gall-bladder opened, inflamed; two stones were impacted in the common dilated duct. No indigo was found in scrapings of the gall-bladder mucous membrane, or in the mucus covering the gall-stones at the time of operation. Three days later, however, a few indigo grains were found in the bile flowing from the fistula, and two days later still more was found in the mucus flowing from the gall-bladder and coating the gauze wick.

These cases, then, suggest the fact that a reflux mucus stream becomes established from the duodenal papilla, along the bile ducts to the gall-bladder, in cases in which a fistulous opening has been made into the gall-bladder and by means of this current the indigo particles are conveyed.

It will no doubt be urged, on the other hand, that

the indigo was absorbed in the ordinary way, by blood or lymph stream, from the gastric or intestinal mucous membrane, and was only detected in the bile after excretion by the liver. There are, however, many facts which oppose this explanation.

We have seen that indigo passes, for the most part, unchanged through the alimentary canal, and is not absorbed from the stomach or intestine. It is, of course, known that soluble indigo, in the form of sulphindigotate of soda and other soluble dyes, such as carmine solutions administered by the mouth, do color the bile (see Naunyn on Cholelithiasis. New Sydenham Society).

I find on examination that indigo, itself a very insoluble substance, is slightly soluble in bile, and can be deposited from such solution on evaporation as minute crystalline needles, and never, as far as my observation goes, in the shape of large or amorphous particles. Now the indigo obtained from the fistula in these cases was in the form of fair-sized, irregular masses, sometimes bright blue granules, never crystals. Moreover, it is a suggestive fact that they are found chiefly in the mucus lining the gall-bladder, rather than in the rapidly flowing bile.

Further, in the third and fifth cases indigo was absent from the contents of the gall-bladder and bile duct at the time of operation, although the patient had been taking it previously, while it was found in the bile and mucus regurgitating from the fistula when this was fully established some days later.

In order to throw additional light on this point, I fed a guinea-pig for some days with indigo, and then, after killing the animal, examined the contents of the gall-bladder. No indigo was found in the bile contained in the gall-bladder, nor did any crystallize out on evaporating this dryness. A scraping was then taken of the mucous membrane lining the gall-bladder, and numerous bright blue indigo granules were found. The bladder itself was then opened out on a slide and cleared, but no indigo was found in the peritoneal or muscular coats. This observation is also important, as in this animal the bile and gall-bladder currents were normal, and unaffected by fistula.

On these and other grounds I have no doubt that the indigo found in the bile in these cases is actually conveyed along the mucous channel of the bile and cystic duct from the duodenum, and not by way of the blood or lymph stream. No doubt it is only sparingly present, and considerable examination of quantities of bile and mucus is necessary to find it. But we must remember that the opening of the biliary papilla in the duodenum is only a lateral one—an open window, as it were, past which, and not directly into which, the hurrying duodenal stream of semi-digested food is passing, and it is only such few particles of indigo as adhere and cling round the opening of the duct that will be carried by the mucus current along the duct to the gall-bladder.

It will be suggested that if indigo particles find their way thus, why not particles of food? And, indeed, I think it very probable that such small particles do pass in this manner from the bowel under the altered conditions of the bile circulation, in fistulae of the gall-bladder. I have myself found, in the fistulous bile, along with blood, cells, bile pigment, epithelial cells, pus and other substances—particles, which look, under the microscope, suspiciously like cellulose and vegetable fiber.

We must remember that, owing to the surgical operation, and the establishment of the gall-bladder

fistula, the normal action of this viscus has been suspended, there is no longer any outflowing stream of mucus passing from the gall-bladder along the cystic and common bile ducts into the duodenum. In fact, there are many difficulties in accepting the conventional, bile reservoir, function of the gall-bladder. And in view of the demonstrated importance of a continuous mucous stream, along the bile, and other mucous ducts, in the direction of their flow, I am strongly inclined to think that one important, if not the chief function of the gall-bladder, is to supply this lubricating stream.

The question of the origin of gall-stones also intrudes itself on our notice. Does the demonstrated passage of inorganic particles along the bile ducts from the bowel, under the abnormal conditions of gall-bladder fistula, throw any light on this important question?

I fear at present we are not justified in making any definite statement on this point. Given, however, a temporary cessation of normal bile flow along the ducts, or of a normal mucous flow from the gall-bladder—a condition, in fact, produced pathologically, somewhat resembling the condition present in gall-bladder fistula, produced by surgical operation—we may, I think, say this much: that it is probable that not only may the upward passage of even non-motile infective organisms be possible, but that minute foreign particles may, under these conditions, find their way into the gall-bladder and serve as nuclei for the deposition of biliary concretions.

We know from Naunyn's valuable work on cholelithiasis (see New Sydenham Society's *Translations*, 1896) that pathological changes in the epithelium lining the biliary passages are more important factors in the causation of gall-stones than any alteration of the chemical composition of the bile. Naunyn also showed the influence of stagnation of bile in this matter and the important rôle played by pyogenic organisms derived from the intestine, especially bacillus coli, in causing the cholangitis and catarrh of the mucous membrane of the ducts.

We know from the observations I have described that the temporary diversion, or reversal of the direction of, the bile current brought about by gall-bladder fistula favors the entrance of minute particles from the duodenum into the bile ducts. Does it not, therefore, appear likely that the temporary stagnation of bile flow, probably associated with cholelithiasis, and present in certain pathological conditions of the liver and duodenum, may really operate by bringing about a like entrance of micro-organisms along the common duct, with possibly, minute foreign particles also, which may serve as condensation nuclei. Is it not probable that many cases of so-called catarrhal jaundice are thus explained?

The Urinary Tract.—We now pass to the consideration of the urinary tract, from the kidney to the bladder, and from the bladder to the surface by way of the male and female urethra.

We will consider the ureters first. Reverse infection of the pelvis of the kidney so frequently occurs from interference with bladder function by septic instrumentation that the ureter is universally regarded as the usual channel of infection, and not the blood stream. When we come, however, to consider the manner of this ureteral infection, the successive steps are not so clearly known.

In extreme cases of marked obstruction to the outflow of urine from the bladder, in which backward pressure of urine leads to dilatation of the ureters, and in which the interior of the bladder has become infected,

by instrumentation or otherwise, it is of course quite possible that the open water-way, by arrest or reversal of current, may explain the upward carriage of infective organisms. At present I have not had an opportunity of testing the transference of indigo to the pelvis of the kidney in these cases. The more important point, however, was, if possible, to determine whether, supposing that from any cause (such as the establishment of a renal fistula) the normal downward current of secretion from the kidney to have been arrested—whether under these circumstances any regurgitation of mucous stream occurs in the normal, or at all events undilated and competent, ureter.

The following case has an important bearing on this point:

Lumbar Nephrectomy for Cystic Destruction of the Kidney by Calculus Impacted in the Lower End of the Ureter.—The calculus was detected by a probe in the ureter at the time of the nephrectomy, but the condition of the patient was such that it was thought wiser to bring the open end of the ureter to the skin surface in the loin, and remove the calculus at a later date through a vaginal incision. This was done one week later, and a good recovery ensued. After the operation of nephrectomy the bladder was irrigated daily, and two drachms of an iodoform emulsion, containing sterilized indigo, allowed to remain in the bladder.

The fistulous opening of the ureter on the loin was lightly plugged with a little white sterile gauze. This and the muco-pus from the ureter were examined daily, and on three occasions numerous indigo particles were found, showing that here, at all events, a reverse mucous current had passed up the ureter in the absence of any urine.

The position, then, at present, is probably this: Given an arrest, from any cause, of the normal downward current of urine along the ureter it is possible that a backward mucous current may occur, carrying with it any infective organisms or foreign particles, such as pus, or blood cells, or debris, which may be present in the bladder.

What we do not at present know is whether this regurgitation occurs in those cases of kidney infection in which there is no direct evidence of arrested secretion. We are not at liberty to assume, however, that even in such cases temporary arrest does not occur. It is, indeed, known that the flow of the urine from the ureteral orifices is intermittent under normal circumstances; it is possible that this intermittency may be increased to the point of temporary arrest under pathological conditions.

We still have to consider the question of the entrance of infection into the bladder from outside; the conditions, in fact, of the mucous currents in the urethra.

I will first consider the male urethra. The conveyance of infection from the exterior, in the absence of any outside interference, with a normal flow of urine along a healthy urethra is, of course, practically unknown. But, as in the case of the gall-bladder, the frequent performance of suprapubic cystostomy for surgical purposes, in the urinary bladder, affords opportunities of investigating what goes on in the urethral mucous canal.

I have investigated two cases of suprapubic cystostomy in which the bladder was drained by Sprengel's pump after prostatectomy.

Complete Prostatectomy.—Oct. 20, 1904. Bladder drained suprapubically by Sprengel's pump, blood was present in the urine for ten days, then clear. On October 31, ten days after operation, indigo was inserted within the urethra four inches from the meatus in the

eye of a Jacque's catheter, and again two days later. The urine drained suprapubically was collected daily, and the sediment examined. Indigo grains were found sparingly in the deposit.

Noticing the difficulty in finding such a minute quantity of indigo in such a large quantity of fluid, and the labor involved in searching for it, in the next case I adopted a somewhat different technic.

Prostatectomy for Adenomatous Prostate and Suprapubic Drainage of the Bladder by Sprengel's Pump.—March 25, 1905. The urine remained blood stained for one week after operation, but when clear, eight days later, a little sterilized indigo was inserted into the penile urethra just within the meatus, on one occasion only, no urine having been passed per urethram.

A small piece of white sterile gauze was placed at the bottom of the suprapubic tube or silver cannula, and this served as a filter, through which the urine and vesical mucus passed, before being drawn out by the aspiration of the small inner glass tube, through the suprapubic opening.

The gauze was removed about twenty-four hours later, and a cover-glass preparation taken of the mucus and urine which it contained. Bright blue indigo granules were freely found in varying sized particles.

Now, since all source of accidental contamination from outside was avoided by a dressing over the suprapubic opening, the indigo can only have gained access to the interior of the bladder by traversing the urethral canal.

Further, we must remember that in both these cases no instruments had been passed, and that the urethra was uninjured, at any rate up to the triangular ligament and prostate portion. The main point, of course, being that all passage of urine had been arrested for some days along the mucous canal.

I have also tried inserting indigo within the urethra alongside of a catheter retained in the urethra and bladder, in cases where it has been necessary for surgical reasons for some days to drain the bladder through a tied-in catheter. In several of these cases I have recovered the indigo from the urine flowing from the catheter, showing that the material has passed centripetally along the urethra to the bladder. I do not feel, however, that much stress can be laid on this, as there is always more or less to and fro, or inward or outward movement of any instrument tied in the bladder; it tends to be expelled, and is passed back again and re-secured, as the movements of the patient after its position, and it is thus quite possible that, by friction of the instrument against the wall of the urethra, any material might be mechanically conveyed, in successive waves, along the urethra to the bladder.

This objection does not, of course, apply to the previous cases in which no instrument was used; but, at any rate, the experience of the latter case shows how easy it is for infection to be conveyed from a dirty meatus alongside a retained instrument into the bladder; for if inorganic particles can float, as it were, in the mucous stream which is set up between the instrument and the urethral wall, and are carried thus backwards into the bladder, infective organs can do the same. It is not necessary to assume that they must be conveyed on the point of or by a dirty instrument; they may reach the bladder by way of the urethra from the surface at the meatus after the introduction of the instrument.

In fact, surgeons know well that even though the urine be received by a tube direct from the catheter into some antiseptic fluid, without contact with the air, yet it is practically impossible to keep the bladder aseptic for any length of time in cases in which an instrument trav-

ersing the urethra is tied in the bladder, and I think the above observations throw some light on the manner in which, and the route by which, this infection is brought about. At any rate, they point to the extreme importance of guarding the external orifices, and probably careful disinfection of the external meatus and the application of efficient antiseptic filtering dressings at this spot would have a good influence in preventing bladder infection in the manner above described, especially in those cases (and they should be very few) in which it is necessary to tie an instrument in the bladder.

One word as regards the short female urethra. In one case of vesico-vaginal fistula, with a very considerable opening, in which it was necessary to perform suprapubic cystotomy and operate from within the bladder, the opportunity afforded by subsequent suprapubic drainage was utilized to trace the urethral mucous stream in the female urethra. A little indigo was inserted just within the meatus, and a small filtering plug of sterile gauze inserted in the suprapubic tube through which the urine was draining. Indigo granules were found in the mucus coating this plug when removed six hours later.

We have thus traced the reflux passage of inorganic particles of a recognizable substance, like indigo, from the surface, along the urethra to the bladder and from the bladder to the upper end of the ureter. In all cases the important associated condition has been that the normal flow of urine has been diverted.

We still require observations on cases of pyelitis, made at the time of the operation, when the pelvis of the kidney is first explored, and in which indigo has previously been inserted into the bladder.

Observations on animals will probably be necessary to investigate this point, under conditions in which no previous diversion of the urinary flow has been brought about by surgical operation or disease.

The mode of infection of the epididymis by the tubercle bacillus, or by the gonococcus, or pyogenic organisms requires further examination.

I have not yet been able to test the mucous current in the vas deferens, but I think it likely that sterilized indigo inserted into the prostatic urethra in suitable cases will be recovered from tuberculous and other abscesses in the epididymis or the vesiculae seminales. If this should occur, then, the mucous canal of the vas deferens, and not the blood stream, will probably be the route taken.

Respiratory Tract.—With regard to the respiratory tract, and the mucous canals in connection with it, the accessory nasal cavities, the Eustachian tubes, and the bronchi, any observations on this part of the body are all, of course, open to the obvious objection that foreign particles may be, and no doubt are, carried by the air currents and distributed over the mucous surface.

I should, however, like to mention one case of chronic otitis media, with tympanic perforation, in which sterilized indigo was insufflated for four days into the retropharyngeal cavity. The muco-pus flowing from the external meatus was collected on both sides, and on the fourth day showed abundant indigo granules.

Of course, it will be objected that owing to some effort of sneezing or blowing of the nose the material was transported up the canals by a blast of air. The patient was instructed to avoid all such expiratory efforts, and I am inclined to think that the presence of the indigo in the internal ear is not due to this cause.

Supposing, however, that such is the case, it is surely a matter of considerable importance that in, at any rate, cases of perforated drums, not only air currents should pass habitually from pharynx to middle ear, but that

foreign particles should also find their way up the Eustachian tubes in the absence, of course, of all instrumentation. The bearing of this on the question of conveyance of infection from pharynx to middle ear is obvious, though, in the case of tympanic perforation, the important condition of diverted flow is present.

Glands.—We now pass to the consideration of the glands with ducts opening on to the surface of the body, and the possible conveyance of pigment particles along the ducts, from the skin to the alveoli of the glands.

The mammary gland, with its numerous ducts opening on the nipple, is the largest and most important of these glands. In a case of duct cancer of the breast, for six days before removal of the breast sterilized indigo was rubbed on the nipple twice daily, and a simple dressing of wool worn. Great care must, of course, be taken to avoid contamination of the exposed breast tissues at the time of the operation, but this, after all, is an object lesson in surgical technic, and the same precautions in the way of repeated washing and sterilization of the skin, which are taken to prevent contamination by skin organisms, will apply to the indigo also. In order to ensure absence of contamination, I have either coated the nipple and surrounding skin to be excised with a layer of gauze and collodion, or, having turned up the flap of skin to be excised inwards all round the nipple, I have tied this by a purse-string suture, thus leaving only the raw surfaces exposed.

The whole breast, after removal, is laid on a slab, with the deep surface uppermost, and the incisions are made into the breast tissue in the neighborhood of the ducts and into the portion affected by the cancer. Scrapings were taken from these incisions and indigo granules were found sparingly, but from several parts of the breast. Other cases of mammary cancer have yielded the same result. I have also examined unstained sections of breast tissue obtained in the same way in two cases of cystic disease associated with chronic mastitis, in which indigo had previously been applied to the nipple, and detected it in the breast.

In a case of chronic mastitis, with a scirrhous nodule in one part of the breast, in which indigo was applied for four days before operation, the pigment was found in the portion of mammary tissue containing the ducts, just beneath the nipple, but not in the solid portion invaded by growth. Now, the importance of this fact, of the conveyance of pigment particles from the skin to the deeper parts of the mammary gland, along the lacteal ducts, lies in its application to the question of the transference of infective organisms by the same route.

Here, again, it is a question of conveyance by blood, or lymph stream, as against the transference by mucous currents along the ducts, and it seems to me that the demonstration of the passage of inorganic pigment particles by this latter route strongly confirms the suspicion that it is by these duct channels that pyogenic and probably tubercular organisms gain access to the mammary gland.

I feel some hesitation, in the present unsettled state of the cancer problem, in mentioning cancer in this connection. All I will permit myself to say is this: That, if in the course of future research, the exciting cause of cancer shall be proved to be parasitic, the above observations may stimulate inquiry into the nipple route, as a possible channel of infection in cancer of the breast.

Conclusions.—We have now passed in review the conditions present in the more important mucous canals and gland ducts opening in the interior of the body, and in one case in the ducts of a gland opening on the skin

surface, and a few general observations bearing on the facts so observed may not be out of place.

I think from the observations I have described we may consider it proved that by some means or other, and under certain conditions, particles of an insoluble substance, such as indigo, inserted into the orifices of a mucous canal or duct are conveyed along the mucous channel in a reverse direction to that taken by the contents of the tube, or by the secretion or excretion of the glands along such ducts. The conditions which seem to favor this passage are:

First, some interference with the normal flow of the contents of the mucous tube or duct; some arrest or diversion of secretion, such as is produced by a fistulous opening, though it is by no means necessary that this should be complete.

By what agency is this transference of foreign particles brought about?

Ciliary Action.—Though present in the upper generative tract, cilia are absent in the lower genital tract, in the intestinal canal, in the biliary ducts, in the urinary tract, and in the ducts or glands opening on the skin.

Muscular Contraction.—No doubt irregular or reversed peristaltic contractions in the bowel, if present, would bring about the result. It is, however, suggestive that the ascent of the indigo up the colon is not prevented, but rather accelerated, by the increased downward peristalsis produced by purgatives. Reverse muscular contractions are as yet, moreover, unknown, or rather undemonstrated in the bile ducts, urethra, and urinary tubes, Fallopian tubes, or in the ducts of glands.

The phenomenon is not due to physical agency alone, such as capillary action. It is absent in the non-living tube. The transference of particles in empty tubes and ducts is one, and there are other reasons, before explained, for regarding the mucus which coats the walls of the tube or duct, as the vehicle in which the particles are carried. Further observations are necessary to ascertain whether a reverse current—a sort of mucous backwater—is present in all mucous channels, or whether it only exists where the normal outgoing current of secretion or excretion is interfered with. Such a back current is probably present to a certain extent normally, though much increased by any agency, such as a fistula, which starts a flow of mucus from the other end of the canal.

The essential conditions, then, seem to be a living tube, whose walls are partially if not wholly in apposition, and lined by a mucous secretion; while the reversal of this mucous current is favored by any condition (such as a fistula) which leads to arrest or diversion of the ordinary secretion of the viscus or gland.

The bearing of these remarks on the larger question of infection will be at once apparent.

I am inclined to think that in some cases more attention should be paid to mucous channels as routes of invasion, rather than to the lymph or blood stream. Thus I have spoken of the large share which such a mucous, as opposed to a blood infection, plays in the diseases of the female generative tract. The rapid ascent of the urethra by the non-motile gonococcus, and the colonization of deeper portions of the tube, apart from direct extension of growth and in the absence of instrumentation or injection, are thus explained. The ascending infections of the kidney by way of the ureter can also be investigated from this point of view.

Our knowledge of the causes which produce biliary and urinary calculi is still very incomplete. The facts which point to the importance of diseased conditions

of the mucous linings of the excretory tubes, in favoring the disposition of concretions, are of especial importance from this point of view. And bearing in mind the proved transference of particles, under certain conditions, from duodenum to gall-bladder and from urethra to ureter. I hope that further light may thus be thrown on these calculous diseases.

In fact, the burden of my remarks points to the necessity for the active recognition of the importance of all communications between the efferent canals of the body and the external world, and thus accentuates the value of personal hygiene and true cleanliness.

Gentlemen, I hope I have not wearied you with these remarks on what may be called surgical physiology and pathology. As I said at first, instead of pointing to new operations or improvements in surgical technic, instead of giving statistical tables indicating case-mortality after operations, I have tried to turn your attention the other way, and to glean a few facts from the many opportunities which modern surgery affords for the observation of fundamental processes of organic life.

And yet, without the surgical revolution which we owe to a few great men, and which has been one of the glories of our century, these life-giving operations would have been unperformed, and the light which they have shed in many a dark corner of the human body would never have shown.

Though the public (the mass of our fellow-creatures) are only beginning to grasp, as yet very imperfectly, the all-pervading influence which medical and surgical science, and indeed all the sciences which deal with physical and mental efficiency, will assuredly soon exert in the life of the Individual, the City, the Nation, and the State; yet it is surely fitting that we medical men, who know these things, should ever recall the services rendered to humanity by the Pasteurs, the Listers, the Kochs, and all those who have done so much to raise our calling to its present proud position—all those who have made these things possible.

And how better can we show our gratitude to them than by strenuous individual effort, each of us, in spite of much distraction and scanty opportunity, to add one small fact to the store of garnered knowledge; to bring even one stone to the building of that glorious Temple of Health whose topmost pinnacle will only be finished when disease and suffering have been finally vanquished.

MEDICAL PROGRESS.

NEUROLOGY AND PSYCHIATRY.

The Fear of Death.—J. LEONARD CORNING (*Jour. A. M. A.*, May 6) discusses the morbid exaggeration of the fear of death, which he considers due to a neuropathic basis inherited or acquired. In animals the fear of death is dependent on its imminency; in man it is sometimes a permanent obsession, but it is even then usually absent in the actual process of dying, the dulling of consciousness at that time and other dominating physical conditions accounting for this fact. He reports a case illustrating what he considers the essential psychology of the morbid dread of death, in this case even exciting suicidal impulses—death to escape death. In treating this condition he would suggest the thought that sleep is a sort of death, and unconsciousness whether lasting or not, a boon. His treatment was to prevent sleep until it was sought imperatively, and was based on the theory of proving experimentally that the temporary unconsciousness of sleep is the remedy for curable shortcomings and convincing the reason that

the more lasting unconsciousness of death is only the supreme antidote of the irremediable breakdown of the organism, and therefore supremely benevolent in its essential nature.

Syphilis and General Paralysis.—The following conclusions are offered by JORROY (*La Clinique*, April, 1905): Syphilis is not the efficient cause of general paralysis, which is not a disease of syphilitic nature. Mercurial treatment is of no value in the prophylaxis of paresis, which is not cured by it, and which may be made dangerous by this treatment.

Suggestion.—E. J. RUNYON (*Jour. A. M. A.*, May 6), calls attention to the need of a proper mental attitude toward the power of suggestion, which, as he says, "runs like a thread through every method of treatment, wise or otherwise." He also notes the dangers of self-deception in medicine and of drawing deductions from imperfect data or without due power of discrimination. While suggestion is often a power for good in the hands of the physician, it is one that may be abused and result in great and lasting harm. It is the main instrument of the pretenders; he reviews some of the noted instances of their exploitation of human credulity. The point emphasized by him is that the true practice of medicine is the intelligent application of common-sense principles and forces.

Chronic Nephritis.—W. M. LESZYNSKY (*Med. Rec.*, May 20, 1905), says that, aside from the various neurasthenic manifestations occurring in patients with chronic nephritis, many of the transitory subjective nervous phenomena arising during the course of the disease are the result of uremic—or possibly other—intoxication in varying degree, while nearly all of the transitory objective nervous phenomena, and the more permanent and incapacitating or fatal complications, are primarily due to the concomitant arterial disease. Hence palpable evidence of arteriosclerosis and high blood-pressure is usually of the greatest significance. The many forms which the nervous disturbances attendant on nephritis assume are described in detail, and several illustrative cases are cited in which the failure to recognize the uremic condition underlying symptoms apparently of nervous origin led to serious results.

The Curability of Early Paresis.—C. L. DANA (*Jour. A. M. A.*, May 6), suggests that paresis, like tabes—with which it is closely related as a para-syphilitic disorder—may be arrested in its earlier stages. By "arrested" he does not mean the well-known remissions of the disease; in these, he says, there still remains a certain amount of paretic mental impairment, but he rather means a complete disappearance of all evidence of degenerative changes in the brain. He reports a number of cases illustrating his contention, in which symptoms decidedly indicative of paresis appeared, characteristic mental changes, convulsions, Argyll-Robertson pupil, etc., but which disappeared under treatment, and the patients remained well for various periods under observation. The treatment generally consisted in complete change of life, anti-syphilitic medication, preferably hypodermic, hydrotherapy, and attention to the general nutrition. He says there is no *a priori* reason why paresis in the early stages may not be sometimes cured, and he holds that the cases he here reports point that way and indicate the importance of an early diagnosis and treatment of this disorder, which has been heretofore considered incurable.

Functional Insanity.—In a treatise on this subject R. JONES (*Practitioner*, May, 1905) advances the view that many of the morbid mental conditions known as insanity are functional, and that therefore there are diseases of function as well as of organs. The author states that while we are accustomed to find in disease fine structural alterations, which account for the morbid phenomena, yet nature may experiment in so fine, subtle and obscure a manner as to alter the function of an organ or group of organs, without leaving any evidence of definite or appreciable change in structure. There are many cases who suffer from perverted sensations, or anesthetics, parasthesias and dysesthesias, from pains or algeasias, from loss of power or paresis, from various affections of the sense organs, and even from mental abnormalities, yet who have no discoverable nervous lesions to account for these symptoms, and whose lowered vitality and consequent incapacity can only be described as functional. In support of this view the author states that if we except definite lesions accompanying parietic and other forms of dementia, certain neuronics and other changes in acute delirium, and the deficiency of brain development in idiocy and imbecility, there is no pathology of insanity. The author includes in the class of functional insanity which have no demonstrable pathological lesions the following classes of cases: Hysteria, epilepsy, hypochondriasis, chorea, suicidal manifestations, some forms of alcoholism. Throughout this class there is always an inherited tendency toward the production of the same mental affection.

Intermittent Claudication and Allied Syndromes.—J. R. HUNT (*Med. Rec.*, May 27, 1905) contributes an exhaustive study of all aspects of this affection, which was first described by Charcot in 1858. The literature since that time is reviewed, and alcoholism, syphilis, gout, nicotism, diabetes, exposure, flatfoot, compression by a truss aneurism the neuropathic diathesis and congenital insufficiency of the cardiovascular apparatus are cited as etiological factors. The pathological findings may be summed up in the one word, angiosclerosis, though in advanced cases secondary changes of a trophic nature frequently occur, and the vasomotor element is also of importance in producing the spasm. While the typical picture of the disease comprises intermittent limping with the paroxysm during activity and complete freedom during rest, sensory symptoms and weakness may in some cases be present more or less constantly and give rise to errors in diagnosis. Cases in which the anus, rectum or bladder, brain, kidney or retina were affected have been recorded, and it is also thought that the paroxysms of angina pectoris were referable to a similar condition of the coronary arteries. The prognosis as regards cure is unfavorable, but by suitable treatment, consisting of rest, potassium iodide, cardiac tonics, warm foot baths and galvanic foot baths, much may be done toward warding off indefinitely the threatened gangrene. Digitalis, ergot, nitroglycerin, very hot or very cold baths should be avoided. Four illustrative cases are described, and in conclusion the author says that angiosclerosis of the extremities in its gravest form, uncomplicated by a vasomotor neurosis, leads to spontaneous gangrene. If the angiosclerosis occurs in combination with a vasomotor instability and a tendency to vasomotor spasm, the syndrome of intermittent claudication results. This is characterized by the development of

sensory (pains and paresthesia) and motor (weakness and rigidity) manifestations during functional activity with a rapid and permanent restoration to the normal during rest. The syndrome, however, has a wider and more general application to the whole circulatory mechanism and has been observed in relation to various organs of the body—heart, intestines, brain, kidney and eyes.

The Action of Formic Acid in Diseases Accompanied by Tremor.—One of the most troublesome symptoms that resist treatment in nervous diseases is tremor. Experiments performed by E. CLEMENT (*Comptes rendus*, May 1, 1905), show that formic acid has a remarkable action on muscular tone, causing a sensation of increased muscular firmness. The author investigated the effect of formic acid in certain forms of tremor, in which the muscular weakness is marked. He used this substance with success in two cases of tremor, one a woman sixty-five years of age, and the other a man of seventy-two years. The first case had lasted ten years, and the second eighteen years. They were not examples of senile tremor, for the chin, lips and head were not affected. The tremor disappeared in rest, which excluded Parkinson's disease. On voluntary motion the tremor was quite exaggerated, it was not rhythmical, nor did it have the oscillations of muscular sclerosis. Both cases showed a loss of the patellar reflexes. In doses of four grains of the normal solution of formic acid, this substance produced results at once rapid and surprising. In two days the improvement was so marked that the patients could raise a glass to the lips without discomfort, and without spilling half of the contents. Improvement continued, although the tremor did not entirely disappear, owing probably to the long duration of the motor troubles. No other drug can compare with formic acid in its efficacy in this direction, not even hyoscyamine, which has hitherto been the drug by choice. It would be interesting to investigate the efficacy of this new agent in Parkinson's disease and in certain forms of chorea.

PRESCRIPTION HINTS.

Treatment of Cerebrospinal Fever.—The chief indications are to feed the patient on milk, adding brandy, if necessary; the bowels should be kept free. The spasms are best treated by hypodermic injections of morphine in three-minim doses, but they may also be controlled by a combination of bromides and chloral hydrate as follows:

℞ Potassii bromidi gr.xx
Chloral hydratis gr.xii
Syrupi aurantii m.xxx
Aq. chloroformi ad. ʒi
Misce. Ft. Mist. Sig. Two tablespoonfuls to be taken three times daily.

The following medicine may also be found of use in persistent cases of cerebrospinal meningitis:

℞ Potassii bromidi gr.xii
Potassii iodidi gr.x
Syrupi aurantii ʒss
Aq. dist. ad. ʒi
Misce. Ft. Mist. Sig. Two tablespoonfuls to be taken three times daily after food.

Some physicians recommend the administration of potassium iodide in small or moderate doses as soon as the diagnosis of cerebrospinal meningitis is made. This should be continued three times a day.—*Practitioner*, June 15, 1905.

THE MEDICAL NEWS.

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THE SIGNIFICANCE OF THE DIMINUTION OF FREE HYDROCHLORIC ACID IN THE STOMACH IN MALIGNANT DISEASE.

As a diagnostic sign, the absence or marked diminution of the free gastric hydrochloric acid has been accorded considerable weight in determining the presence of malignant disease of the stomach. The cause of this diminished secretion has been unknown, or has at least been attributed to an atrophy of the acid cells of the gastric mucosa, or an inhibition of their function by the ulcerative process in the wall of the stomach. That this absent, or retarded, secretion is not due to purely local causes, but is an expression of the constitutional disturbances underlying the malignant process, is the latest conclusion based upon experimental investigation.

This research was conducted by Prof. B. Moore (Proc. Royal Society, May 24, 1905), who studied the chemical composition of the gastric juice in cases of malignant growths, not only of the stomach, but also of other organs. He discovered that in malignant disease of any organ there is a marked diminution of free hydrochloric acid in the stomach in all cases below one per cent., or else an entire absence of this substance. The interpretation of this finding has

suggested to the author certain interesting and, at the same time, important speculations on the subject of the etiology of cancer.

The chemical processes underlying the formation of hydrochloric acid in the stomach reside in the specific activity of the oxyntic (acid) cells of the gastric glands. These cells bring about the reaction between sodium chloride and disodium orthophosphate brought to them by the blood, with the formation of hydrochloric acid. Whatever the true explanation of this formation may be, there can be no uncertainty as to the fact that the precursors of hydrochloric acid exist in the blood, and that they consist of hydrogen and chlorine ions, in whatever combinations these may be. Now, it is known that hydroxyl ions also exist in the blood, which, accordingly, has both acid and alkaline reactions. Whatever causes tend to diminish the hydrogen ions in the blood cause a corresponding increase in the hydroxyl ions, and vice versa.

A number of explanations may be advanced to explain the inability on the part of the acid cells to bring about the chemical elaboration of hydrochloric acid. One of these is that the acid cells are atrophic; yet, while this may be true in cases of malignant disease of the stomach, there is no reasonable connection between such atrophy and malignant disease of other organs, in which deficient acid secretion also occurs. Such atrophy, moreover, has not yet been demonstrated. A second possibility has suggested itself, namely, that the malignant process inhibits in some way the function of the oxyntic cells. This explanation is shattered by the following observation made by Moore: "The radical operation was performed on a case of carcinoma of the breast, and many weeks later, after the patient had been discharged cured, the deficient secretion of hydrochloric acid still continued." The third explanation, which is the one advanced by the author, holds that the deficiency of acid secretion is the result of a diminution of the hydrogen ions in the blood. To quote this investigator, "the persistence of absence of acid secretion after the growth has been removed points to the view that the condition of the blood and most probably the absence or marked diminution of acid ions in it is to be regarded as a cause predisposing to growth formation, and not as an effect of the growth."

This view, which, if correct, will clear up the misty subject of cancer etiology, has a strong basis in experimental investigation. The researches of Jacques Loeb have clearly demon-

strated that each tissue depends for its health upon the chemical equilibrium of its immediate environment—the blood. This equilibrium consists in a delicate balance of the various inorganic salts. If one or more of these be increased, diminished or removed, there results a disturbance or an arrest of function. With respect to the effect of a diminution of the hydrogen ions and an increase of the hydroxyl ions, the following experiment, performed by Loeb, has an important bearing: He found that 1 c.c. of decinormal caustic soda (representing the hydroxyl ions), when added to 100 c.c. of sea-water, causes a remarkable increase in the development and growth of the eggs of the sea-urchin. A greater amount of alkali stops the growth entirely. It is thus seen that a slight increase in the hydroxyl ions acts as a powerful stimulus for cellular proliferation.

Inasmuch as an increase in the hydroxyl ions either absolutely or relatively is a necessary concomitant of diminution in the amount of hydrogen ions contained in the blood, which diminution has been found to occur in malignant disease, there are strong grounds for believing that this increase of hydroxyl ions plays an important rôle in the genesis of new growths. The tendency of recent research has been to attribute these abnormal cellular proliferations to a reversion of the cells to their habits in early embryonic life. There is, in fact, a latent tendency on the part of the living units to return, on the slightest provocation, to their primitive state of unchecked, riotous multiplication. It needs but a slight disturbance of the chemical equilibrium of the blood and other tissues to set in motion these inherited capacities of the cells for extravagant reproduction. Whether or not this stimulation is afforded by the reduction in the hydrogen ions and the increase of the hydroxyl ions of the blood, remains for future investigation to decide, yet the researches of Loeb and Moore are very suggestive in showing the chemical origin of new-growth.

The tendency to a recurrence of malignant disease, even after all traces of new-growth have been radically extirpated, strongly supports the hypothesis of the dependence of this condition on the chemical nature of the blood, which is not influenced by surgical procedure.

Apart from these speculative considerations, the discovery that there is a diminution or an absence of free hydrochloric acid in the stomach in malignant disease of any organ, has an important practical application. When this disease is latent, an

examination of the gastric contents may give an important clue to the diagnosis. From the viewpoint of treatment, moreover, it would be interesting to note the effect of drugs that increase the number of hydrogen ions in the blood.

RADIATION THERAPY AND COMMERCIALISM.

A SIMPLE rehearsal of a recent set of incidents apparently not closely related to each other, and yet that on consideration will prove to have much more intimate associations than might be suspected, seems worth while giving for the sake of the lesson in certain modern medical advertising methods which it contains.

Some months ago there came the announcement widely heralded in all the daily papers of this country, that a very prominent educator, known to be suffering from a severe form of internal malignant disease, had been treated by various forms of radiation therapy and the result, it was said, had been eminently successful. Immediately there were editorials and special articles of many kinds hailing this new remedy for cancer and great hopes were raised in the breasts of all those who are suffering from malignant disease.

The medical press of the country paid very little attention to the sensational news, and mentioned it only to deprecate the raising of hope that would probably not be fulfilled. The announcement of cures for cancer is frequent enough, but cancer still continues to count its victims with even greater frequency than ever, and at the present time at least one in thirty of all who die, die from malignant disease. At the important meeting of the Association of American Physicians, at Washington, the only reference made to the recent sensational reports was the very conservative statement that cancers of the cecum usually run a rather slow and uncertain course and that though the opposite might be expected from the constant irritation, malignant disease of the large intestine in general, seldom developed to a rapidly fatal termination. Several of those who took part in the discussion on abdominal tumors, agreed with this statement but no reference was made directly to the case that has attracted so much attention.

Much as we might like it to be otherwise, the hopes that have thus been raised seem destined to be dashed to the ground quite as effectually as have similar expectations on previous occasions. This was, of course, what conservative physicians

and surgeons who knew the conditions and who realized the possibilities had expected, though they would only too gladly have been disappointed in this particular case. In the meantime, the sensational announcement of the cure supposed, has gone forth to work harm and to raise false anticipations surely doomed to disappointment.

There is also another feature of the case that is interesting. Not long after this cure was announced, there came news from Europe that the price of radium had advanced. Only a very minute amount of the metal in its pure state, somewhat less than one-half ounce, it is said, is available for any purpose whatever. It was declared that so many demands were made on this small amount for the various purposes of experimental research that the supply did not equal the demand, and a rise in price was the consequence. There are good grounds, however, for saying the stock of radium now on the market is in the hands mainly of a few persons, and that to use the familiar phrase, there is a corner in it. Not only this, but it is said that the sources of radium consisting mainly of various forms of pitchblende found in Central Europe, are all now practically controlled by a few individuals who have a commercial understanding in the matter.

It has been extremely interesting to note how much of free advertising has been given this commercial combination, because of the sensational character of the recent news item. That the whole thing has been worked up very well there is no longer any possible doubt. Whether the effort to create a new market for radium will be successful or not must depend upon further experiences. It is well, however, for physicians to realize just how this set of incidents hangs together and just what the significance of much of the newspaper comment really is.

Unfortunately the failures of the new method of treatment will never attain as wide publicity as the original announcements and so medical quacks will have the opportunity to play upon the feelings of sufferers and pretend to use radium as a curative agent, when some other quite harmless material is being employed. One conviction for the use of a simple solution of cinchona, instead of radium, has been obtained in New York. As it is extremely difficult to obtain radium now, it would seem as if to secure further convictions along this line, in cases where false pretenses of its use are attempted would be easy.

ECHOES AND NEWS.

NEW YORK.

Filtering the City Water.—Dr. Darlington advocates the filtering of city water, and has recommended to the Mayor that the city install a plant for that purpose.

Death-Rate Down Again.—The deaths in this city last week numbered 455, as against 639 the week before, and the death-rate was 20.68 against 28. For the corresponding week last year the rate was 20.66. Deaths from heart disease were again normal. The number of deaths from sunstroke fell from 151 to 27, while cerebrospinal meningitis, with 10 deaths, was at its lowest ebb.

Mr. Straus Reads a Paper.—At the recent meeting of the British Medical Association, Mr. Nathan Straus, of this city, read a paper on the need of milk for infant feeding in large cities and told what had been accomplished by his milk depots in New York. The paper created considerable interest among those who heard it, and will be published in the *British Medical Journal*.

Yellow Fever Precautions.—Although repeatedly assuring the public that there is no chance of yellow fever getting a foothold in New York, Dr. Doty makes assurance doubly sure by rigid inspection of all ships from southern ports, and the detention of any persons found with high temperatures. Numbers of such persons have been found on several ships from Gulf ports and from Central America, but none have developed the fever.

Fresh Air Charities.—Health homes, seaside cottages, floating hospitals, and children's summer homes have been filled to overflowing during the hot weather with poor women and their sick infants. During the recent hot wave the Children's Aid Society sent above 3,000 women and children to the seaside or to the country. There will be six weeks more of summer heat and suffering. The Children's Aid Society relies on the dwellers of this city for continued contributions. Checks may be sent payable to A. B. Hepburn, Treasurer, or C. Loring Brace, Secretary, at 105 East Twenty-second Street.

The President Visits Sea Breeze.—On July 29, President and Mrs. Roosevelt visited the Sea Breeze Home for the fresh-air treatment of children suffering from surgical tuberculosis. They came from Oyster Bay in the Sylph, and went ashore without any salute or other demonstration, as they wished to pay a quiet visit to the children. All the little patients who were old enough to know what was happening were delighted with the honor paid them, and the President's party went away enthusiastic about the work being done there. Mr. Roosevelt said: "The hospital has room for only 45 children, and there are more than 4,000 cases of bone tuberculosis in the tenement house district of New York. The trustees are trying to raise a fund for a hospital which shall hold 400 patients. The Fresh Air Fund people are obliged to refuse admission to 2,000 or 3,000 applicants annually. I was immensely impressed by the work being done there. I feel that there can be few more beneficial works than that which is being accomplished both in connection with the Fresh Air Fund and this seaside hospital for tenement children suffering from bone tuberculosis."

A Novel Port Boat.—The port of New York will have as part of its public equipment, at an early date, a craft mainly for hospital purposes, the counterpart of which does not exist anywhere. The boat is mainly

designed for the work of transporting sufferers from contagious diseases to the hospitals at North Brother Island, and for this service the craft will have the most modern appliances that science can suggest, at the same time it will be fitted out with powerful pumps, and it is hoped that it will prove a great factor in the extinguishing of fires along the river fronts. It is also intended that the boat shall be used as a water-carrying craft, having a tank capacity sufficient to supply any of the public institutions located on the islands of the New York harbor in the event of an accident to the pipes affording the present source of supply. The new boat will be known as the *Claudine*, and will be 126 feet long and 30 feet beam. The hospital section will be on the main deck and will consist of eight rooms, each liberally endowed with windows. These rooms are laid out in such a manner that it will be possible to reach any one of them without passing through any of the others, thus preventing the spread of contagion as well as avoiding the disturbance of patients. On the upper deck will be quarters for convalescents and visitors, nurses and doctors attending patients on the boat, patients being returned to the city as cured, and an office for the physician in charge. A morgue will be located in the bow of the boat on the main deck. All of the rooms are of steel, and may be closed up as tightly as a steel box, to permit of being thoroughly disinfected when occasion requires. In the finishing of the interiors, all angles of shelves which might afford lodging places for dust and germs are eliminated. The pumping facilities of the craft in case of fire will be considerable, but in addition to this there has been left a clear space on the deck large enough to accommodate a city fire-engine, and in case of an emergency such an apparatus may be loaded on board and transported to any part of the harbor. The *Claudine* will be fitted with twin screws and will have a speed of fifteen knots an hour; the boat will be of light draught so that it will be possible to navigate in any part of the harbor. The new craft will represent an expenditure of \$70,000. This boat is being built on Staten Island, and will be launched in a short time.

PHILADELPHIA.

Application for Hospital Charter.—Having conducted Roosevelt Hospital, 1815 Frankfort avenue, as a private enterprise for some time, Dr. Franklin Brady has now made application for a charter to make the institution a public hospital. Dr. Brady's associates are Charles Glanz, 1025 Market Street; Henry C. Kellner, 301 East Girard Avenue, and Amos Brady, 2009 North Thirteenth Street.

Fear of Outbreak of Typhoid Fever.—Since the change in the source of the water supply the residents of Holmesburg and the vicinity have taken extra precautions to avoid an epidemic of enteric fever. The water supply until recently was taken from Sandy Run, but since the Holmesburg Water Company merged with the Disston Water Company it is obtained from the Pennypacker Creek, which the residents say is polluted. Chief Medical Inspector A. A. Crains, without taking the change in the source of the water supply into consideration, tried to allay their fears by telling the residents that until the present time fewer cases of enteric fever have been reported from the section of the city in question than any other.

To Guard Philadelphia Against Yellow Fever.—Since the news of the outbreak of yellow fever in New Orleans has reached this port rigid quarantine has been established. Inspectors have received strict orders to examine every vessel regardless of the place

from which it hails, but especial attention must be paid to those coming from Panama, Southern ports and India. Drs. Horning and McCool were instructed to hold vessels should any of the passengers or crew show the slightest symptoms of the disease. Dr. Henry D. Heller, State Quarantine Physician at Marcus Hook Station, feels confident that no cases will pass the scrutiny of his deputies. He believes the station of this State could scarcely be improved, and is prepared to combat the disease should any cases show themselves.

New Bids for the Municipal.—From his investigations Mayor Weaver has discovered that "graft" found its way into the letting of the bids for the new Municipal Hospital. Apparently there were two firms bidding, but in reality only one, because on one of the contracts the one firm bid low and the other high, while on the second contract the one bid high and the other low, so that each firm had its purpose pretty well "cornered." Then, too, each contract was so let that the work would not be completed because it was alleged that the city did not have enough money at the present time to complete the work. According to the plans arranged by the former Director Smyth, the Mayor said the new hospital would have cost \$3,000,000. Everyone is at a loss to know why the Department of Public Safety let the bid for the construction of the hospital instead of the Department of Health. If Mayor Weaver finds, as announced, that the funds are insufficient nothing will be done until finances will permit; then new bids will be let to complete the hospital.

To Determine the Sources of Pollution in the Schuylkill River.—Working cooperatively, Health Commissioner Dixon and Director Martin have instituted searching parties on the Schuylkill River to determine if possible places which are sources of pollution. Dr. Dixon's party began at Reading and came down the river, while Director Martin's party began its search at Philadelphia and worked up the stream. The small tributaries of the river will be explored, notes taken and then a complete report will be sent to the Department of Health. From previous inspections, Phoenixville is regarded as an especially dangerous point, while Pottstown and Mill Creek are also thought to be menaces to the health of Philadelphia. Attention will also be paid to villages and to farm houses along the river; if refuse, now thrown in the stream, can be burned just as easily, those responsible for such acts will be asked to burn it. The State Department of Health will treat the Allegheny River in a similar manner, although this stream is in a better condition than the Schuylkill River.

War Upon Flies and Insects.—At the meeting of the Board of Health of Philadelphia the following resolutions were adopted: Resolved, That the chiefs of the divisions of nuisances, milk and meat and cattle inspection are hereby directed to visit all retail dealers exposing for sale in front of their properties meats, fish, vegetables, fruits, candies and cake, and to instruct the proprietors that covering of some suitable material must be provided to protect the goods so exposed from flies and insects generally. Resolved, That the chief medical inspector, nuisance, milk, and meat and cattle inspectors be and they are hereby directed to instruct the inspectors connected with their respective divisions to inspect regularly all manure pits of all stables, private or livery, that exist in their districts, and to give instructions to owners or keepers thereof that stables and pits must be kept in clean condition, and where the pit is on the exterior of the premises it must be kept tightly closed or screened with wire. If a stable is connected with the premises they

visit an inspection must be made and a report made to the chief of the division, who in turn will report to the chief of the Bureau. The assistant medical, nuisance, milk and meat inspectors will visit all places designated in the resolutions and will make a thorough inspection of the establishments referred to therein, as well as direct the owners or agents that they will have to comply with the new regulations.

CHICAGO.

Enlargement of Hospital at Fort Sheridan.—An addition to the Post Hospital at Fort Sheridan, which will cost approximately \$19,000, and will contain two wards for contagious diseases, with a capacity of 36 beds, has been begun.

State of Chicago's Health.—According to the weekly bulletin of the Health Department for July 29, public-health conditions have again become normal. There were 109 fewer deaths reported during the week than during the previous week and the annual rate of 13.57 per thousand is 17.3 per cent. less for the week and 15.5 per cent. less than the average July rate of the previous twelve years. This average was 16.06 per thousand, the highest having been 26.94 in 1893 and the lowest 14.34 in 1900. The rate for the twenty-nine elapsed days is only 13.16 and the month promises the lowest July rate on record. A larger proportion than usual of samples of milk and cream were found below grade during the week. So far as the inspector's samples are concerned this was due to work in the Polish district. Six unvaccinated children, all under ten years of age, were removed to the Isolation Hospital. This is the lowest number of smallpox cases in any week since last fall. There are 47 cases remaining in the hospital; no death during the week and no case so serious as to make a fatal result probable.

Crime in Chicago.—City Statistician Hugo Grosser made public a day or two ago his figures for the first quarter of 1905, and Prof. John A. Fairlie, of the Department of Administrative Law in the University of Michigan, said that the report of the police department's activity, given in detail under a system devised by Mr. Grosser, was of great sociological value. The report shows that the greatest number of arrests of men and women were for larcenies, and that white Americans led the list, with colored Americans second. The total number of charges of larceny preferred were 1,310. Of violations of the city ordinances there were 8,892, of which white American men were credited with 4,733; white American women with 541; colored men, 505; colored women, 134; Germans, 531; women, 48; Poles, 495; women, 52. Three American women and two of other nationalities essayed the confidence game and 10 women of all nationalities were accused of burglaries. Only one man was arrested during this period for selling liquor to minors or drunkards. Married men and women, according to the statistician, are more law-abiding than those unmarried, the score standing 8,359 single men, and 951 single women to 3,593 married men, and 536 married women. There was a decrease in the total number of arrests as against the same period last year, but an increase in the arrests for felonies.

GENERAL.

Panama in Tuberculosis Congress.—Dr. Ciro Urriola has been appointed to represent Panama in the international tuberculosis congress, which will meet in Paris next October.

Cholera Epidemic in India.—A serious epidemic of cholera prevails among the refugees from the fam-

ine-stricken districts of British India, who have been crowding into Madras for weeks past. Numbers of victims have been found dead or dying on the streets. The death-rate is 89.7 per 1,000.

Dr. Woods Hutchinson Removes.—During the past three years Dr. Woods Hutchinson has been a resident and practitioner in Portland, Oregon. Hereafter, however, he will be located at Redlands, Cal., as Consulting Physician to the Arrowhead Springs. Dr. Hutchinson will also lecture at the Medical Department of the University of Southern California, located at Los Angeles.

Cases of Yellow Fever Outside of New Orleans.—Cases of yellow fever have been reported in Louisiana at Bunkie, Bayou Goula, Shreveport, and Point Barrow. A single case occurred at Tampa, Fla., and one at Lumberton, Miss. All the patients were Italian refugees from New Orleans, and so far the disease has failed to get further foothold outside the infected city.

Typhoid Fever Spreads.—The epidemic of typhoid fever which is raging in the Bath Beach and Fort Hamilton sections of Brooklyn is said to be due to the improper sewerage and to bathing in the polluted waters of the lower bay. Physicians are greatly alarmed over the increased typhoid fever cases in that section. At Bay Ridge great concern is felt over a threatened epidemic, which the physicians have been fighting for several weeks. Polluted water is blamed for the conditions there.

Heavy Death-Rate.—Thus far the death-rate in New Orleans of the discovered cases and recorded deaths is almost 25 per cent. heavier than it was even in 1878 and approximating the percentage of 1854, the latter the worst yellow fever attack New Orleans has ever experienced. This is explained by the health authorities on the ground that the disease has existed almost entirely among Italians—and that among a class very ignorant, very suspicious, and very filthy. They have insisted, whenever not watched, in eating macaroni and bananas the minute the fever had passed, and have frequently dropped dead in consequence.

Menace to Oyster Industry in New Jersey.—Planters of the Shrewsbury oyster are aroused over an attack upon their industry. The State Board of Health has notified the Shrewsbury township health board of the danger arising from the practice of certain persons who empty their sewage into the north and south branches of the Shrewsbury River, particularly the South Shrewsbury. It is stated that the pollution of the water injuriously affects clams and oysters. Claim is made that an outbreak of typhoid at Oceanic was caused by the use of clams taken from the South Shrewsbury. The township board is advised to prohibit the sale of shellfish taken from that river.

Suffering from Quarantine.—New Orleans is said to be suffering more from the erratic quarantine arrangements of her neighbors than from the fever itself. These shift from day to day, and nearly every town has a different quarantine. Besides the local restrictions against the city, the fact that the fruit trade has been diverted to other ports by the detention ordinances issued by New Orleans has worked much hardship among the Italians, some 2,000 of whom were employed exclusively in handling such cargos. Considerable indignation is also manifest against Gov. Vardaman, of Mississippi, who insists on measures the most stringent between the two States.

Yellow Fever on the Isthmus.—Reports from the Isthmus continue to give additional cases of yellow

fever and occasional deaths, but the fact that no widespread epidemic occurs would indicate that the prophylactic measures taken there are successful in a degree at least. John Barrett, formerly Minister to Panama, and now Minister to Colombia, declared last night that the yellow fever would be driven out of the Isthmus. "The fight against yellow fever is like a great battle," he said. "Every effort is made to stamp out the disease. The people of the United States must not be impatient if the progress of the canal is slow. They must remember that the scene of operations is 2,000 miles away from the base of supplies."

Mosquito Pest Nearly Conquered.—Destruction of mosquito larvæ by petroleum and the weeding out of shrubbery in moist places where the insects breed at various summer resorts have made those places pleasant to live in where in former seasons patrons of hotels and residents of cottages were disturbed till they were made frantic by myriads of the pests. Reports from various points in New Jersey and Long Island prove that the mosquito is nearly conquered. Southampton and Babylon are freer than in twenty years past. All small streams and creeks about Lawrence and Cedarhurst, and those about the Rockaway Hunt Club, were thoroughly cleaned during the last spring, and the frequent use of oil, sprayed on mud flats at low water, has brought about the absence of the pests. At Spring Lake, N. J., notable work by the Board of Health and citizens shows that these efforts have been successful. The reclamation of low lands in the immediate vicinity of Atlantic City and the filling in of old cisterns and stagnant pools have practically stopped the mosquito from breeding there. The only invasions from which the resort suffers from these pests come when the land breeze blows them in from the country.

The Yellow Fever Situation in New Orleans.—The first days of the present month found New Orleans with a record of 79 deaths from yellow fever, and a total of 378 cases, all but twelve occurring among Italians, and all but one among the poorer class. All things considered, there is a disposition to take an optimistic view of the situation. The fever has not spread as rapidly as had been feared, in view of the quarter where it broke out and the length of time elapsing between its first appearance and its detection by the health authorities. It is believed now that all concealed cases have been discovered. Surgeon-General Walter Wyman, of the Public Health and Marine Hospital Service, returned to Washington at the first report of the fever to take charge of the situation, and the department has some of its best men in New Orleans. Surgeon White is in charge. The city as a whole responds enthusiastically to appeal for systematic prophylaxis, and the work of exterminating the *Stegomyia* and its breeding places is progressing rapidly. "We are fighting," said one of the business men, "to do more than simply save a few lives just now. We are fighting to kill the bugbear of quarantine that has checked every proposed development of the city's commerce. We are going to show that yellow fever can be stamped out."

American Association of Obstetricians and Gynecologists.—The American Association of Obstetricians and Gynecologists will hold its eighteenth annual meeting at the Hotel Astor, Longacre Square, New York, Tuesday, Wednesday and Thursday, Sept. 19, 20 and 21, 1905. Dr. Robert T. Morris, 616 Madison Avenue, Chairman, Dr. Samuel W. Bandler, 229 West Ninety-seventh Street, and Dr. James N. West,

71 West Forty-ninth Street, constitute the local committee of arrangements, one or all of whom will gladly furnish information to members and guests upon application. The following is a list of papers offered up to the present date: The President's address, by Howard Williams Longyear, of Detroit; title to be announced, J. H. Carstens, of Detroit; title to be announced, Magnus A. Tate, of Cincinnati; Personal Experience in Hysterectomy for Myofibroma of the Uterus, by Miles F. Porter, of Fort Wayne; title to be announced, J. W. Hyde, of Brooklyn; Diagnosis, by John B. Deaver, of Philadelphia; Treatment of Prolapsed Uteri, by H. E. Hayd, of Buffalo; Perineal Injuries and Methods of Repair, by Joseph Price, of Philadelphia; title to be announced, H. C. Pantzer, of Indianapolis; Appendicitis as a Factor in the Diagnosis of Abdominal and Pelvic Diseases, by Rufus B. Hall, of Cincinnati; title to be announced, W. A. B. Sellman, of Baltimore; Indications for Hysterectomy in Puerperal Eclampsia, by Charles G. Cumston, of Boston; title to be announced, Edwin Walker, of Evansville; title to be announced, John Young Brown, of St. Louis; Papillary Cystadenoma of the Breast, by Edward J. Ill, of Newark; Normal Saline Solution and its Application to Conditions, by Walter B. Dorsett, of St. Louis; Colon Bacillus Leucorrhœa, by Robert T. Morris, of New York; Gall-stones in the Cystic Duct, by L. H. Dunning, of Indianapolis; title to be announced, O. H. Elbrecht, St. Louis; Pelvic Infection—Etiology, Routes of Invasion, Pathologic Changes and Clinical Courses, by John B. Murphy, of Chicago; Surgery of the Liver, by William J. Gillette, of Toledo; The Treatment of Puerperal Eclampsia, by E. Gustav Zinke, of Cincinnati; The Evolution of the Anterior Transplantation of the Round Ligaments for Uterine Displacements, by A. H. Ferguson, of Chicago; title to be announced, H. Howitt, Guelph; Myomectomy, by W. P. Manton, of Detroit; title to be announced, Thomas B. Eastman, Indianapolis; Extraperitoneal Pregnancy; Three Cases of Prolonged Gestation; Operation by Marsupialization; Recovery, by Charles A. L. Reed, of Cincinnati; title to be announced, F. F. Simpson, Pittsburg; title to be announced, L. S. McMurtry, Louisville; Some General Principles in Conservative Pelvic Surgery, by J. F. W. Whitbeck, of Rochester; title to be announced, Charles L. Bonifield, Cincinnati; title to be announced, John D. S. Davis, Birmingham; title to be announced, K. O. Werder, Pittsburg; title to be announced, B. Sherwood Dunn, Easton; Observations Respecting Treatment of Face Presentations, by A. P. Clarke, of Cambridge; title to be announced, C. C. Frederick, Buffalo. All members of the medical profession are cordially invited to attend the scientific sessions. Howard Williams Longyear, President; William Warren Potter, Secretary.

OBITUARY.

Dr. WALTER I. BRADBURY, of Boston, the physician in charge of the State bath house, Nantasket Reservation, Nantasket Beach, Mass., was drowned while bathing in the surf on July 31.

Dr. GEORGE B. WOODSIDE died at New Harbor, Maine, July 28, where he was shot on Tuesday by Arthur, the fifteen-year-old son of Joseph McFarland, of Charlestown, Mass. Young McFarland, who was passing a vacation at New Harbor, was discharging a revolver, when the physician, driving by, received a bullet in the right temple.

SOCIETY PROCEEDINGS.

THE AMERICAN MEDICAL ASSOCIATION.

*Fifty-sixth Annual Meeting, held at Portland, Oregon,
July 11, 12, 13 and 14, 1905.*

SECTION ON PRACTICE OF MEDICINE.

SECOND DAY—JULY 12TH—Continued.

(Continued from Page 233.)

SYMPOSIUM ON ANIMAL PARASITES AND TROPICAL DISEASES.

Amebic Dysentery in the Philippine Islands.—Dr. W. E. Musgrave of Manila, P.I., discussed the symptoms, diagnosis and prognosis of dysentery of tropical character due to the ameba. Dr. Musgrave said that the most important period of the disease is that in which it is latent. In a number of cases the ameba is present in the intestines for a long period, causing only vague intestinal symptoms, and then, under favorable conditions, lighting up severe and sometimes even fatal dysentery. The absence of diarrhea is one of these features of these cases. This latency may represent an incubation period, but it seems much more likely that it should be considered the first stage of the disease in which the lesions are high up in the colon and give no dysenteric symptoms. Such affections may be dangerous and death has occurred after only a few days of acute symptoms, apparently a fulminant case of the disease.

High Localization.—The most prominent feature of these latent cases is the fact that the ameba causes its lesions only in the ascending and transverse colon and in the cecum. The symptoms then are pain and tenderness, referred to the course of the colon. No ameba is found in the stools unless a hydragogue cathartic is given. The absence of the ameba does not make a negative diagnosis of amebic dysentery. In the case of a young married woman seen recently the only symptoms were those of general lassitude, and there was absolutely no diarrhea. After a cathartic was given amebæ were found abundantly. Two months later some discolored blood occurred, and it was evident that ulcerative stage of the disease had been reached. Under injections there was improvement, and then there was diarrhea after an interval during which she was not treated owing to absence in Japan. Ten months after the amebæ were first seen sudden dysenteric symptoms developed, and the patient died in three days. At the autopsy old ulcers were found in the upper colon from which there had been a sudden general infection of the intestines.

Cure Without Treatment.—The Philipinos themselves evidently have amebæ in their intestines for many years without serious symptoms. Not infrequently healed ulcers are found at autopsies late in life, showing that the disease can be spontaneously cured without active treatment. Frequently death takes place from inter-current disease, and then the ulcers are found present in the cecum and transverse colon. When treatment is instituted early liver abscess occurs very rarely. In fact, American physicians have been surprised at the few liver abscesses that have occurred in cases under their care. Dr. Musgrave himself has not seen a single case of liver abscess in a thousand patients treated by him.

Diagnosis.—The diagnosis of the disease must be made, if possible, with the microscope. The clinical picture is helpful, but may deceive. Abdominal soreness along the course of the colon is singularly the

most valuable symptom. In early stages of the disease this soreness is likely to be localized over the cecum and the lower part of the ascending colon. Nausea and indigestion are dubious symptoms, though loss of weight while patient maintains a good appetite must always excite suspicion, especially when the patient has recently come to the tropics. Early treatment is the most important thing for the disease; for in cases treated early no infection of the liver takes place. According to statistics, 20 per cent. of untreated cases develop liver abscess. When there is any doubt salts should be given freely and the stools carefully examined. Castor oil and the use of enemata for diagnostic purposes are not likely to be of much service. The speculum is helpful only when the lesions are in the rectum and lower bowel.

Prognosis.—The prognosis cannot be lightly made. There must be careful weighing of all the conditions. If the latent period of the disease has existed for a long time, then the prognosis is bad. In young adults recently affected the prognosis is always good. The children of the natives recover without treatment. To wait until blood and mucus occur in the stools always adds to the seriousness of the prognosis. Prompt treatment by injections is not only effective for symptoms, but prevents complications.

Pathology and Etiology.—There is no doubt now that this form of tropical dysentery is due to the presence and the pathological activity of the ameba. There used to be some doubt about this, but it has disappeared under the continued investigations. The ameba as a normal inhabitant of the intestine does not occur under ordinary circumstances. The walls of the gut under the influence of ameba become thickened and edematous. The first lesions seen are punctate in form, and capillary hemorrhages may be present. After this comes an erosion of the superficial layers of the mucous membrane. Sometimes the organism penetrates through the epithelial layer without producing any lesion and is found lying on the basement membrane. The distribution of the ulcers is rather characteristic, and is not entirely limited to the colon. Ulcers have been found in the ileum as much as 40 cm. above the valve. Not infrequently the cecum is found nearly covered with ulcers, and then the appendix is also sure to be affected.

Importance of Latent and Early Mild Cases.—Dr. George Dock, of Ann Arbor, Mich., said that Dr. Musgrave has thrown more light on the diagnosis and pathology of amebic dysentery than any other investigator. The importance of calling attention to the latent and early mild cases cannot be overestimated. These cases are entirely free from dysenteric symptoms, no amebæ are to be found in the stools, no blood even altered in character is passed, and yet amebic dysentery exists. If an ounce of Carlsbad salts be given the amebæ may be found in the stools. It is sometimes thought to be difficult to find the ameba, but salts will always bring it if it is present and no warm stage is needed on the microscope for its recognition. The stools should be received in a flat porcelain vessel, and then suspicious portions may be picked out.

Vigorous Treatment.—Dr. Dock has seen a number of cases of returned soldiers who had served in the Philippines. The affection is easy to stop after beginning, but difficult of treatment later on. Vigorous cathartics form an important part of the treatment. Large injections should be given, and Dr.

Dock has found strong salt solution almost as good for this purpose as the silver enema, which is so often recommended. It is important that patients should not be allowed to become constipated. Ipecac is useful in many cases, and may be given with salol with excellent effect. In one case Dr. Dock gave thymol for uncinaria. Amebæ were also present, and disappeared at the same time. It must not be forgotten amebic dysentery may occur in cold climates, and is by no means limited to the tropics, and that a number have now been reported in many parts of the country in patients who have never lived outside of the United States.

Dr. Williams, of San Francisco, said that in a number of cases that he had seen during a residence in the Philippines, one striking feature seemed to be that liver abscess did not occur so frequently in women as in men.

Dr. Shattuck, of Boston, said that he had one patient under observation, suffering from true amebic dysentery, with many amebæ in the stools, who had never lived out of New England. The disease, then, is not essentially of the tropics, and it is probable that many cases are being missed in various parts of the country, and that the dysentery is considered to be due to other causes.

Sudden Death in Amebic Dysentery.—Dr. Claude A. Smith, of Atlanta, Georgia, related the case of a patient admitted to the hospital suffering from severe dysentery, in which death took place on the day after admission, and before any definite study of the condition could be made. At the autopsy a large number of old amebic ulcers were found, besides a fresh infection extending along most of the colon. It seems not unlikely that some of the sudden deaths that occur in hospitals elsewhere may be due to this affection. It emphasizes the necessity for careful study of the intestines of all cases of sudden death.

The Ameba in Manila.—Dr. Musgrave said that the ameba occurs in the water of Manila. Occasionally these amebæ in water are supposed not to be pathogenic. Whenever amebæ found in the stools contain red blood cells it seems not unlikely that they are pathogenic, though this has not been definitely settled as yet. An ameba that seemed to be non-pathogenic after passage through the monkey was found to contain red blood cells. Later, however, this ameba seemed to revert to its original less harmful condition. The most important thing about amebic dysentery is that it may be cured completely if well and early treated. So far Dr. Musgrave has had no recurrences in his cases. The large number of Philipinos that come to autopsies with scarred bowels indicate that there may be recovery from the disease even without treatment, and that, therefore, the outlook is hopeful. Dr. Musgrave has seen ameba occurring in the stools of what was considered to be a normal bowel, but always later the development of the case showed that lesions were present.

Infection in Uncinariasis.—Dr. Claude A. Smith, of Atlanta, Ga., discussed the mode of infection in this disease, and exhibited lantern slides of certain experimental demonstrations of the infection through the skin by means of this parasite. Dr. Smith said that the uncinariasis is one of the most common diseases in the South, though its presence has not been suspected until recent years. In country districts particularly the parasites occur very frequently in the stools, and as there is no proper disposal of sewage, opportunities for infections are frequent.

The larvæ of flies burrow in the stools, and so produce avenues of entrance for oxygen, in the presence of which the eggs of the parasite develop very rapidly. This combination of two insect pests is not uncommon in nature, and the mode of life of one seems to be calculated to help the other.

Investigation of Stools.—If enough soil be added to the stool to destroy the odor, this supplies enough oxygen to enable the eggs to develop well. Under these circumstances the larvæ of this parasite develop very rapidly and in large numbers. If kept in a deep jar they climb up the side and evidently develop a considerable range of movement. This shows that the larvæ might also climb up on grasses and vegetables and perhaps produce infection in the intestinal tract of persons consuming these substances. As none of the animals are liable to this disease, however, so far as investigation has gone, cannot be considered to be important.

Experimental Demonstration of Infection.—Dr. Smith found that a large proportion of moisture is necessary to have the larvæ develop well and actively. At certain seasons there is not enough moisture, and consequently infection is rare. When a certain amount of fecal matter containing enough soil to make it inodorous, but containing a large number of uncinaria larvæ, was applied to the back of the wrist of an individual who offered to undergo the experiment, infection occurred. For six days the material containing the larvæ were placed on the patient without any effect. On the seventh day, however, he complained of itchiness and irritation. This developed into a stinging sensation. The material was allowed to remain for an hour, and then the spot beneath it became red and hyperemic. After twenty-four hours some swelling was noticed and this swelling extended also to the back of the hand. After the hyperemic stage vesicles formed and the edema became marked.

Infection of the Intestines.—For several days the area of irritation on the back of the wrist was allowed to remain untreated, and then was treated just sufficiently to prevent itchiness. Six weeks after the placing of the infected material on the back of the wrist the eggs of the parasites were found in the stools. After a time the patient demanded treatment, as he was losing weight, and then some 1,300 larvæ were found in his stools. It is evident that this very extensive infection occurred entirely from the irritated patch on the back of his wrist.

Ground Itch and Infection.—It is evident that uncinariasis occurs as the result of infection through the skin, and it seems not unlikely that this is the only method of infection. Children in country districts who go barefoot become infected, and then by scratching spread the infection. Secondary infection with bacteria occurs, and this seems to favor the progress of the previous parasite. After some weeks there is disturbance of digestion, and the whole clinical picture, due to the presence of the parasite, develops. Fortunately the weather in north Georgia favors infection only at two periods of the year—in the late spring and early fall, when there is a moisture with sufficient warmth. In south Georgia the opportunities for infection are more frequent, and the disease is consequently commoner.

American Achievement in Disease Eradication.—Dr. Richard Cabot, of Boston, the Chairman of the Medical Section, then said that there were two great achievements in medicine effected since the Spanish-American war, of which Americans may well be

proud. Cuba has been freed from yellow fever, from which the island had been a sufferer for four centuries. American physicians are engaged in the work of freeing Porto Rico from the anemia due to uncinariasis, which has been a scourge of the island for as long almost as history runs. Two physicians particularly, Drs. Ashford and King, are engaged in an active campaign against this disease. They travel around with a hospital equipment of tents, camp outside of a town, and are practically treating a whole people. Those who suffer from the severer forms of the disease are taken directly into the hospital tents, while those with less severe symptoms are given the remedies for use at home. Their work illustrates what may be accomplished even when a disease is so endemic as this anemia of Porto Rico is, and shows that modern advance in medicine can accomplish wonders. Only the work of Reed and Carroll, in the investigation of yellow fever, seems to be of equal importance to this.

Uncinariasis in California.—Dr. Brown, of San Francisco, said that there are three classes of cases who suffer from this disease in San Francisco. The first class consists of Mexicans, some poor, but some of the better classes. The second class are soldiers who served in the tropics, were discharged without symptoms, and yet have later developed signs of the disease. The third class consists of Porto Ricans who were sent to Honolulu in order to replace Japanese laborers, but who did not succeed as was expected. In the cases seen in San Francisco one of the most significant features is the seriousness of the symptoms that may develop, yet with very few parasites present. In one case only seven parasites were found, and yet a nearly fatal anemia had occurred. Among the Porto Ricans in San Francisco it is noted that no infection occurs among the children, so that it seems probable that only a cutaneous mode of infection brings the disease into the system.

Modes of Infection.—Dr. Smith said that it is not as yet decided whether there is some other mode of infection besides that through the skin. In answer to a question he replied that the parasites seem to travel from the point of entrance into the system through the veins. In his experimental observations some of the veins for a distance around the area of inoculation became reddened so that red streaks were present. These resembled phlebitis, however, and there was no infection of the lymphatics. In the blood stream the parasites pass through the lungs and heart, and so find their way to the intestines. In the South, during the summer time, outside of the cities all of the children of both rich and poor go barefoot, hence the frequent possibility of infection. It is reinfection, however, oftener repeated, that leads to the severe symptoms of the disease. City children of vigorous constitution recover from a single infection. Country children are infected over and over again, until they develop anemia of a severer type.

Course of the Disease.—It is often said that as children grow older in the country they outgrow their tendency to this anemia. As a matter of fact, however, what happens really is that they begin to wear shoes, and then there are no further infections, and their resistive vitality overcomes the disease. It is a mistake to consider that children suffering from the disease are necessarily either lazy or stupid. They may indeed be very bright. They are not able to do severe manual labor because their anemia pre-

vents them from carrying sufficient oxygen to enable them to take muscular exercise to any extent. One of the students of the Medical School, in Atlanta, though a sufferer from the disease in a severe form, led his class, and was one of the brightest students. Before studying medicine, he had taken all the prizes in the High School.

THIRD DAY—JULY 13TH.

SYMPOSIUM OF THE STOMACH.

Physiology of Nutrition.—Dr. Frank Billings, of Chicago, said that a recent investigation seems to make clear that there has been too high a standard of the amount needed for the balance of nutrition in human beings. This standard has been too high, especially with regard to the proteids. These are the materials that are obtained from meat, eggs, fish, peas, and beans, and the like. Protein material is used for tissue building, while the carbohydrates and fats are consumed as the fuel of the body in order to supply the energy necessary for the work done. When too much proteids are consumed they are changed into crystalline substances in the circulation which have a somewhat toxic action and cause irritation when excreted. The fats and carbohydrates do not produce any such harmful results, and only lead to an undue accumulation of material, but without irritation.

Instinct and Appetite.—How far instinct can be left to guide us in the selection of food and the amount taken has always been a question. Tradition seems to indicate that instinct can be trusted. There has long been an impression, however, that mankind, where it can obtain it, eats too much, and especially too much meat and similar material. Dr. Chittenden, of Yale University, undertook an investigation of nutrition, with the idea of determining how much proteid material was necessary in order to maintain bodily equilibrium and full strength and not have any expensive waste. As the result of his investigations he found that much less proteid material was needed than has so far been considered necessary. His attention was attracted to this subject by the suggestions of Fletcher, who has shown that if mastication were more complete, and the food was brought more intimately in contact with the palate, then there was less appetite for and less consumption of proteid foods.

Conditions of the Experiment.—Dr. Chittenden took three classes of persons for his experimental observations. The first were five members of the faculty of Yale University—men of sedentary habits and mental occupations. The second group consisted of athletes, many of them the best athletes in Yale University, whose diet could be regulated for the purpose. These represented a group doing intense labor and using up muscular substance. The third group consisted of United States soldiers detailed for the purpose, who were also given regular exercise in the gymnasium, and represented people who take an ordinary amount of exercise. Careful observation of these three groups under the ordinary diet for three months, and then on a diet in which there was considerably less proteid material than before. It was found that the balance of healthy nutrition could be maintained with scarcely more than one-half the proteids originally consumed.

Creatinin as the Criterion of Nutritional Equilibrium.—In these experiments it was found that while there was a reduction in the amount of nitrogen

excreted this did not affect all the elements of excretion to the same degree. The amount of urea in the urine was markedly decreased. The amount of ammonia nitrogen was relatively increased. The amount of creatinin nitrogen was relatively increased, but remained essentially the same during the changes of diets. The uric acid nitrogen was diminished, though relatively increased, and evidently corresponded with the excretion of urea. It would seem then that the creatinin represents the criterion of metabolic equilibrium. Folin has found that the extra material of proteid character that is absorbed from the stomach is not oxydized, as was once thought, but is hydrolized, and then passes out through the kidneys. It thus serves only as an irritant, and does no good at all in the system.

The Overeating Habit.—There seems to be no doubt that practically every one eats more proteid material, that is, more meat and similar solid substances, than is necessary. The irritation produced by this useless material can be noted in various painful conditions of joints and muscles, usually spoken of as gouty or rheumatic. In Professor Chittenden's experiments it was noted that when less proteid material was consumed there was much less complaint of these pains, and, indeed, the subjects of the experiments had a sense of well-being not previously possessed. The limitation of diet leaves an absolutely free choice, especially as regards the fats and carbohydrates, and only affects the amount of proteids, reducing it by one-third.

Study of the Gastric Contents.—Dr. George Dock, of Ann Arbor, Mich., said that the study of the chemistry of the gastric contents has unfortunately been neglected. It is sometimes thought to take too much time and require much apparatus. This is not true, however, and the chemistry of the stomach may be studied with very simple means at hand. Some physicians fear that they will not be able to pass the stomach tube properly and with ease. In many thousand cases, however, Dr. Dock has only failed twice, and in both of these he did not have a proper opportunity to use his persuasive powers on the patient. The usual trouble is that there is a lack of training with regard to this investigation of the stomach, and physicians hesitate to take it up for themselves later. There has been much disappointment because the study of gastric chemistry does not give any pathognomonic signs, but this is only what may be expected, since it is becoming more and more realized that it is careful study of all patient's symptoms, and not any one, that enables the physician to make the diagnosis.

Ordinary Reactions.—It was unfortunate that in the early days of the study of the chemistry of the stomach that the announcement was made that hydrochloric acid was absent in cancer. In a large proportion of cases this remains true, but in many cases hydrochloric acid may be found all during the course of gastric cancer. It may even be present in excessive amounts of gastric cancer. An excess of hydrochloric acid is not necessarily present in ulcer of the stomach, though commonly there is an increase in this secretion. Great variations occur in individual cases, and even from time to time a distinct difference in the amount of acid may be found. The investigation of the stomach contents in functional diseases of the stomach.

Lactic Acid and Organic Acids.—On examination with regard to the presence of lactic acid a test meal free from lactic acid should be given. Dr. Dock has

found shredded wheat biscuit excellent for this purpose, and it is withdrawn forty-five minutes after its ingestion. In this, however, as in other features of the chemical investigation of the stomach, too much significance must not be given to either negative or positive results and several trials may be necessary to determine any one point.

Limited Value of Chemical Investigation.—Without other investigations of the stomach contents, the chemical reaction would give very little positive information. If Dr. Dock had to give up the other means of investigation he would consider the chemical as of little service, and would prefer to do away with it. Investigation of the stomach contents, even microscopically, will readily show the presence of excessive mucus, and it should carefully be determined whether this mucus comes from the gastric or the respiratory tract. The presence of pus in the gastric contents can also be readily recognized. But careful investigation must be made to determine that it does not come from the mouth or from the throat. The presence of altered blood in the gastric contents is extremely important. Occult blood can be found better by investigation of the stools.

Microscopical Examinations.—Bits of mucous membrane are frequently contained in the stomach contents, and may give valuable information. It takes some time, however, to harden and examine them properly, but in doubtful cases this should be done. The bacteria present in the gastric contents are of the greatest importance, and must be carefully investigated. Yeasts and sarcinae are commonly found, and are significant, especially in stagnant conditions. Occasionally protozoa may be found in the stomach contents of sufferers from stagnation of the gastric contents, from whom material is removed before the giving of a test meal. The freezing point of the gastric contents is not of importance though it has been carefully investigated. With regard to other body liquids, the freezing point has not proved of as much importance as was thought.

Conclusion and Demonstration of Mastication.—Dr. Dock said that a single examination of the gastric contents is of little or no importance. Very often no information at all is obtained, yet a negative result enables the examiner to collate this with other information. A very important feature of the investigation of the stomach contents is the demonstration to patients of how insufficiently they masticate their food. If an ordinary meal be removed several hours after it has been eaten, the patient will often be surprised to find what large pieces of meat and potato he has swallowed without realizing that they were going down unchewed. After this it is usually much easier to persuade them that they need to masticate their food more thoroughly, and commonly an immediate improvement in the gastric symptoms occurs as a result. If for no other reason than this it would be advisable to pass the stomach tube in certain cases of bothersome indigestion.

Non-Gastric Diseases; Gastric Symptoms.—Dr. J. H. Musser, of Philadelphia, said that the number of cases that come complaining of gastric symptoms through suffering from affections of other organs is very large. It is extremely important to differentiate these two classes of affections. Practically every organ in the body may reflexly affect the stomach. The eye may cause stomach symptoms, as is well known, and fitting with glasses may relieve dyspeptic symptoms that may have existed obstinately, in spite of all treatment, for a long time. Affections of the

nose and throat may in like manner cause stomach symptoms, and this is illustrated by the frequency among users of tobacco susceptible to its influence. Children suffering from adenoids are especially likely to have gastric symptoms. The ear is a special source of stomach reflexes, and even this short review shows that it may be necessary to call in the aid of many specialists to help in the diagnosis of the cause of supposed dyspepsia.

Nervous Diseases and Gastric Symptoms.—The most fruitful source of gastric symptoms, where the primary affection exists in another organ, are those traceable to the nervous system. Sometimes the first symptom of locomotor ataxia is a gastric crisis which seems to be an acute attack of indigestion. The cause may be readily overlooked, and even surgical operations have been done in these cases without recognizing, until afterward, the real cause at work. Brain tumor may produce nausea and vomiting and other acute symptoms. And epilepsy may be responsible for explosive gastric symptoms of the most elusive character. Rumination is not uncommon in milder cases of epilepsy, and undue chewing is another symptom that has been traced without cause to the stomach. In fact, there are no reflex gastric symptoms that deserve more attention than those which come from epilepsy. Dr. Spiller has shown how frequently and how insidiously these symptoms may develop and the additional fact that up to the present time they have not infrequently been missed.

Gastric Symptoms in the Heart.—Whenever there are obscure gastric symptoms it is especially important to examine the heart. Not a few of the cases of acute indigestion, or so-called acute gastritis with pain, and prostration, especially in the old, are due to cardiac lesions of various kinds. Sometimes these cases end fatally yet unexpectedly, and without a post mortem it is difficult to understand just why the sudden fatal termination has occurred. Careful auscultation of the heart should always be part of an examination of a stomach case presenting obscure symptoms, especially with severe exacerbations.

Gall-Stones; Gastric Symptoms.—Of recent years it has been found that gall-stones are much more frequently the cause of what have been called stomach symptoms than what was formerly thought. Sometimes the symptoms point entirely to the epigastrium, and not to the region of the gall-bladder. Gall-stones may be especially obscure in their symptoms, and this fact must always be borne in mind, especially in cases where, according to the history, there has been the opportunity for the development of gall-stones, as after typhoid fever. Affections of any portion of the intestinal tract may curiously enough give rise to symptoms that may seem to be attributable to the stomach alone, though the stomach itself may be comparatively unaffected. Constipation is especially likely to be reflected in indigestion of one kind or another, and not infrequently directed to this fails until there has been proper regulation of intestinal evacuation. The portions of the intestinal tract farthest away from the stomach seem to be most likely to produce gastric symptoms. This is especially true of cecum and colon, and in recent years attention has frequently been called to the fact that affections of the appendix, when long continued, are especially prone to give obstinate symptoms.

The Genito-Urinary Tract.—Reflexes from this tract are of course the well recognized as producing

stomach symptoms. The subject has been exploited in recent years, though, of course, the nervous condition produced by genito-urinary trouble may be the connecting link between the genital tract particularly and the stomach. Wherever anything serious exists in this tract especial attention must be directed to it. In recent years Dr. Musser has found that gonococcus infections of chronic character are especially likely to produce stomach symptoms of various kinds. A secondary toxemia often develops and proves various to treatment. When gastric symptoms, especially in young persons, fail to respond to treatment, careful investigation should be made as to the possibility of the existence of focus of gonococcus infection anywhere in the genito-urinary tract. The prostate should be examined and the urethra carefully investigated by the specialist, otherwise there will be no successful management of the gastric manifestations.

Systemic Conditions and Gastric Symptoms.—It must not be forgotten that anemia always produces gastric symptoms, and that the loss of appetite and perversions of appetite which occur in anemic conditions are directly dependent upon the blood, and cannot be treated by the ordinary remedies for the stomach. It will often be found in anemic conditions that the gastric symptoms will not yield to ordinary tonics, but will be relieved at once by the use of iron and of remedies directed to the correction of the blood condition. In recent years it has been pointed out that many of the cases of chlorosis are really the initial stage of tuberculosis. This calls attention to the fact that the preliminary symptoms of tuberculosis are often gastric. Only too frequently the disease begins insidiously in stomach symptoms, and its true character may be missed entirely unless the physician has his suspicions aroused and looks carefully for the earliest signs of pulmonary involvement. Practically all of the infectious diseases give rise to gastric symptoms. This is true of syphilis as well as of the other infectious diseases, and the stomach symptoms are as manifold as the other manifestations of this protean disease. Even the mild infections may be ushered in by sudden vomiting and by nausea. In children this sudden vomiting may be accompanied by convulsions and some serious stomache conditions may be feared when it is only the beginning of one of the ordinary infectious diseases.

Intestinal Parasites and Gastric Symptoms.—Practically all of the intestinal parasites may cause gastric symptoms with perversions or loss of appetite, or at times greatly increased appetite, yet without gaining weight. All of the various forms of tapeworm produce that symptom, though the clinical picture differs greatly in different individuals, and requires careful analysis. In recent years the frequent occurrence of uncinariasis in this country has come to be recognized, especially at the South, and gastric symptoms are one of the commonest manifestations of an early stage of the disease. Needless to say, in any of these cases the direction of treatment to the stomach entirely is sure to fail, and the patient's improvement depends on the recognition of real pathological condition at work.

Intoxication and Gastric Symptoms.—All of the intoxications produce gastric symptoms. This is especially true of lead, though, of course, mercury and the other metallic poisons produce symptoms. It is not uncommon to find that the serious foundation achylia gastrica is present without any other

cause than the presence of lead in the tissue. In milder cases of lead intoxication, however, the gastric symptoms may be marked, especially with susceptible individuals. Indeed, these may be the first and only symptoms manifest for some time, and require careful investigation in order to discover their cause.

Neuroses.—Practically all of the neuroses produce definite gastric symptoms, though the clinical picture may vary greatly from day to day. Exophthalmic goiter is practically always accompanied by gastric and gastro-intestinal symptoms and, indeed, these are sometimes in severe cases the cause of the later neurotic symptoms. At times the rapidity of heart present together with the gastro-intestinal symptoms are the only ones that herald the beginning of the more serious development of Graves' disease. Gastric neuroses may occur apparently without any cause outside of the stomach itself. Crises of pain and vomiting may occur that seem to indicate some serious involvement of the nervous system, and yet prove, after careful study, to be due only to hysteria or the advanced forms of neurasthenia or nervous exhaustion. In the midst of this discussion of neurotic gastric conditions it must be borne in mind, however, that occasionally definite local causes are found for symptoms that seem at first to be due only to the nervous system. There seems to be no doubt, however, that a local focus of suppuration sometimes produces a toxemia the symptoms of which are noticed more in the stomach than in any other organs. Nature seems to attempt to eliminate toxins in the circulation through the stomach wall and the presence of these poisonous materials in the stomach gives rise to symptoms. It must not be forgotten that the local focus of suppuration may be in the mouth due to the presence of carious teeth or some one of the many forms of peridental suppuration that have been investigated in recent years. Oral suppuration may indeed produce serious stomach symptoms, but even severe general conditions and in all cases of stomach disturbance the mouth must be carefully investigated.

Surgical Intervention in Acute Symptoms.—This constitutes one of the most serious problems that the physician has to deal with. The gastric symptoms may be so acute as to lead both surgeon and physician astray. Vomiting with blood in the vomit may occur to such an extent as apparently to make the diagnosis of gastric ulcer sure beyond all doubt, yet on exploratory incision condition present may prove to be nothing more than a severe congestion of the stomach consequent upon cirrhosis of the liver. In the same way uremia may produce gastric symptoms that simulate ulcer of the stomach or severe gastritis. In a recent case the epigastric pain was so typically localized, the vomiting with blood and the presence of collapse seemed surely to indicate the necessity for surgical intervention for perforating ulcer of the stomach, yet fortunately the remission in the symptoms stayed the surgeon's hand, and when death took place four days later from uremia, the autopsy showed that there was no organic disease of the stomach. In the same way cases of locomotor ataxia may produce the impression that surgical intervention is needed. Indeed, there are a good many cases now on record in which operations have been performed during the course of the gastric crisis of tubes, and a careful investigation of the nervous system with reference to this must be made in all cases where there is doubt. As

a matter of fact, all the organs of the body may produce symptoms reflexly referred to the stomach. Probably a large proportion of the cases of supposed indigestion are really due to stomach conditions primarily, but to affections of other organs reacting directly or through the nervous system upon the stomach.

Stagnation of Stomach Contents.—Dr. Chas. G. Stockton, of Buffalo, N. Y., discussed the question of food stagnation from all causes. It may be considered to be present whenever the stomach fails to empty itself properly of its contents. The material of an ordinary meal should be disposed of by the stomach in four or five hours. If any of it stays after that time a mild amount of stagnation must be considered to be present. Riegel sets the limit at seven hours for the disposition of an ordinary meal. If patients complain then of eructations of food that has been eaten longer than this, then a certain amount of stagnation is present. Serious stagnation, however, causes retention of food for twelve to twenty-four hours, or even longer. The most important symptoms are a sense of distress, with considerable eructation of gas, and even of vomiting. The general symptoms are those of lassitude and feeling of depression consequent of lack of nutrition and the absorption of unsuitable material. The most important causes are obstruction of the stomach outflow with consequent dilatation. At times, however, there may be marked obstruction at the pyloric orifice, yet very little dilatation. It used to be considered that dilatation always occurred in cases of food stagnation, but this is now known not to be true. As a matter of fact, dilatation occurs only in persons who are predisposed to the development of this condition. The most important cause is a weakness of the muscular layer. The condition is prone to develop in members of the same family, so that there seems to be an hereditary weakness of the muscular wall of the stomach. It occurs particularly in those who overload their stomachs, who take large amount of fluid with their meals, who eat very hurriedly, masticating poorly, and, as a consequence, allowing large portions of food to reach the stomach which cannot be easily disposed of, and block the issue of food from the stomach. The eating of coarse food may produce a similar result.

Gastric Weakness in Convalescence.—During condition of convalescence the stomach seems to be predisposed to dilatation. In a recent case a typhoid fever patient ate heartily of a Christmas dinner, and as a consequence suffered from acute dilatation of the stomach. Persons in weakened conditions, after periods of starvation and after a severe illness, during which time much food has not been taken, must be warned of the possibility of this, or otherwise the foundation of a serious enduring gastric condition may be laid.

Stomach Obstruction.—The most important forms of stomach obstruction are due to tumors of the stomach, especially of the malignant variety, and to cicatricial contraction of the stomach walls usually consequent upon gastric ulcer. At times there is spasmodic contraction of the orifice of the stomach as a result of the presence of an active ulcer. The condition of spasmodic contraction of pylorus is not well understood. The presence of even a small ulcer may give rise to such severe contraction as to prevent the exit of food. On the other hand, the irritation of coarse or badly masticated food may in the course of time give rise to a hypertrophy of

the pylorus, which may make it extremely difficult for the stomach to pass on its contents. As a result, there may be at first some hypertrophy of the muscular wall of the stomach, after which dilatation may develop. More important even than the conditions within the stomach, in many cases, are conditions that cause obstruction from without.

Perigastritis.—Not infrequently inflammatory conditions of one kind or another may occur in the neighborhood of the stomach, producing bands of connected tissue which effectually prevent the evacuation of the stomach contents. Besides, there may be pressure of tumors of various kinds, especially of tumors in the neighborhood of the liver, which may close the pylorus. The obstruction may be in the duodenum, and this will prevent the emptying of the stomach. In a word, careful investigation of all the organs lying near the stomach must be made whenever there is stagnation of food, the cause of which is not easy to find.

Diagnosis of Stagnation.—The presence of stagnation of food may be suspected, as has been suggested before, from the eructation of food taken a considerable interval before it is tasted again. It has been said that if there is anything left in the stomach three hours after an Ewald test breakfast, then stagnation is present. Seven hours should be allowed after a meal for the complete emptying of the stomach. Perhaps the best way of all to decide the question is to examine the patient fasting in the morning, after a full meal has been eaten the night before, when, if the stomach is found empty, no serious stagnation of food exists. A complete examination of the patient should be made in order to determine the presence of affections of any other organs, especially in the neighborhood of the stomach. Systemic conditions, such as blood dyscrasias, and various intoxications, sometimes produce functional weakness of the stomach wall and consequent stagnation. This complete clinical investigation is very necessary for a diagnosis.

Treatment.—Mechanical methods of treatment sometimes prove of considerable service in lessening stagnation, and the stomach gradually recovers its tone. Rotation of the trunk in such a way as to assist in the emptying of the stomach is especially important in this matter, and massage is a valuable auxiliary. This must not be massage in general, however, but scientific manipulation of the abdominal wall in such a way as to aid in the passage of the stomach contents. In Dr. Stockton's hands the alternate hot and cold douche produces an active contraction of the stomach wall, and eventually leads to recovery of its tone. Needless to say, the general muscular condition of the patient is important in the matter, and care must be taken that properly directed exercise may help in the general tonic of the muscular system. Drug treatment is not of so much importance as used to be thought, though there are many helpful remedies. In the milder cases particularly, and in order to prevent the development of more serious conditions, the proper use of carminatives and of bitter tonics will be found of special service. The diffusible stimulants must not be neglected, and will often help in restoring tone until a normal condition is re-developed. For an irritable pylorus it is not so much surgery that is needed, and especially not early in the case, but unstimulating food. In some cases under Dr. Stockton's care a moderate liquid diet, with careful selection of material, has improved patients that

seemed to be almost hopelessly ill from irritation of the pylorus, and in whom it appeared to be inevitable that surgery would be needed.

Surgical Intervention.—The surgeon is not needed as often as it is thought in recent times, and it must be remembered that even ulcer of the pylorus, though it produces an ugly condition, may be cured effectually by medical treatment, and is as likely to stay cured as after the use of the knife. After all, it must always be borne in mind that where ulcer of the stomach has occurred once it is likely to recur, and a stomach that has been weakened by surgical intervention is even more likely than the ordinary organ to become the location of a subsequent ulcer. Gastro-enterostomy is often of great service in cases of ulcer of the stomach, but it must never be forgotten that such patients are not in as good condition as they were before, and are likely to suffer from many forms of digestive disturbance. All that the gastro-enterostomy accomplishes is to provide drainage of the stomach, and a natural drainage is always the best.

Surgery of Gastric Cancer.—In cases of stomach cancer, where there is no hope of complete removal of the growth, gastro-enterostomy may yet prove of distinct service. When serious stagnation of food is present nutrition is greatly interfered with, and indeed it is the condition of inanition in gastric cancer that makes the saddest part of these cases. This can be avoided to a great extent by gastro-enterostomy, which will often give those patients a year of comparative comfort and do away with the pains which have been so annoying before. Patients frequently gain in weight, and are able to take up their occupations, becoming quite encouraged. The operation should always be advised, even though a radical good result is not expected.

Lavage.—In certain conditions of dilatation of the stomach, especially with yeast and other fermentations, washing out of the stomach is a very effective means of getting rid of bothersome symptoms. These fermentations may often be lessened by the use of salicylic acid. A combination of lavage and salicylic treatment is especially effectual in many cases. At times the salicylic acid alone will produce results when patients have been suffering very severely.

The Stomach and Other Organs.—Dr. G. W. McCaskey, of Fort Wayne, Ind., in opening the discussion on stomach diseases, said that the stomach produces effects in many other organs, and that the presence of severe indigestion, especially if there is a combination of gastric and intestinal affections, may be reflected in nearly every organ of the body. In most cases the intestines are more directly at fault, but the stomach is not without its share of the blame. Where such disturbances exist the development of renal disease is not uncommon, and the nervous heart symptoms consequent upon stomach disease sometimes weaken that organ and predispose it to more serious affections.

Conservatism in Stomach Treatment.—Dr. McCaskey said that in the treatment of the stomach conservatism is most important, certainly as regards surgery there has been a swing of the pendulum too far toward the extreme of taking cases out of the hands of the physician at a time when they may frequently be benefited by ordinary remedial measures. Unfortunately there is a tendency to think that unless improvement follows treatment very soon there is little hope of eventual benefit. In no department

of therapeutics is time a more important element than in the treatment of stomach diseases. Dr. McCaskey has not found cold douches beneficial in cases of stomach trouble, and cannot agree with the experience of others in this respect. In the matter of nutrition carbohydrates and hydrocarbons must be taken to correspond with the amount of exercise, or there will be disturbance of metabolic equilibrium.

Technic of Use of Stomach Tube.—Dr. Morris Manges, of New York, said that one great reason why the stomach tube is not used more frequently is that the technic of its employment is not properly understood. It is no wonder that many people fail to use the stomach tube to advantage, since they never employ the proper sort of a tube. Over and over again Dr. Manges has seen thin, very flexible tubes that of course could not be passed with any ease. Besides, many of the tubes supposed to be for the stomach consist of elaborate apparatus with bulbs and connections, so that considerable practice is needed for their use. All that is necessary is a moderately thick-walled tube, without any bulb, connected to a second piece of tubing by a glass tube of the same caliber, with a funnel at the end. With this the stomach contents can be obtained and examined without any difficulty. Many physicians display an awkwardness in its use that is the result of lack of practice. But after a certain amount of practice the examination of the gastric contents is simpler than the making of an urinary analysis.

Chemical Reaction.—It is more important to find the qualitative condition of the stomach contents than the quantitative chemism. At times only a very small quantity of stomach contents is available, and then test paper is all that is needed. This may be applied at the eye of the tube in the small quantity of material that is to be found there. Of course a single examination is absolutely useless. Several test breakfasts should at least be employed, and one test dinner. The fasting method, with examination in the early morning, is excellent for the determination of dilatation of the stomach or food stagnation. The gross look of a specimen of stomach contents is often helpful, for it shows the presence of mucus or the absence of proper digestion.

Mastication.—Dr. S. P. Black, of Pasadena, Cal., said that probably the most important single element in the treatment of stomach disease is the insistence on mastication. Undoubtedly after a demonstration with the stomach tube, such as Dr. Dock suggests, there will be less bolting of food. People eat too much, and especially too much of meats and the like, and these materials are found galore in the stools. After all, when thus evacuated, they only produre irritation without doing any good at all. When mastication is more complete the appetite is satisfied with less food, and the patient gets the benefit of all the food taken without expensive waste. No one can dictate in the amount of food taken, however, and even for the same individual the amount varies greatly at different times. Old men, evidently, do not need as much proteid material as young, and those living a sedentary life not so much as those exercising a great deal. Since the New Orleans meeting of the Association Dr. Black considers that there has been a very different realization on the part of the members of the Association of the true significance of chronic rheumatism. Undoubtedly many of the vague pains usually called chronic rheumatism are due to the absorption from the digestive tract of irritant materials improperly digested because the

stomach has been overloaded as a consequence of insufficient mastication of food.

Blood Tests and Pepsin.—Dr. Miller, of Chicago, stated that blood tests are particularly of service in the examination of stomach contents, since even small amounts of blood point to the presence of beginning ulcers of the stomach, and it is in the initial stage that these can be treated to the best advantage. Even when hydrochloric acid is present it may be well to look for pepsin, and in its absence pepsin will often be found to be present and to be rather active. It is easier to find rennin than pepsin, and its presence shows that the digestive ferments are not absent. At times it is difficult to secure all the stomach contents, and then the Ewald aspirator is of special service. Dr. Miller considers that the presence of carcines or yeasts in abundance in the stomach contents furnish a definite proof that the gastric condition is benignant.

Overfeeding and Mastication.—Dr. J. M. Anders, of Philadelphia, said that there is no doubt that most people eat nearly twice as much as is necessary, and that their appetite would be considerably lessened if they chewed their food more and brought it more in contact with their palate. It is impossible yet to decide with any scientific accuracy what should be the variation of food amount for different ages and occupations. This is coming, however, with more definiteness than before. It is to be hoped that the presence of creatinin nitrogen will prove to be the index of proteid metabolism that has been suggested. It remains, however, for further investigators to confirm this finding. In the meantime, definite information can only be obtained by careful analysis of the food digested and the comparison with the excretion in both urine and feces. The influence of exercise, of baths and of sleep in various persons makes the problem much more complex than is usually thought.

Acute Stomach Rheumatism.—Dr. Anders considers that in certain cases of acute pains in the gastric region the proper diagnosis may be rheumatism or its complications. In a case of acute rheumatism, where the joint symptoms were in abeyance, pains occurred in the epigastrium, and only after careful investigation was it found that a dry pericarditis was found. Not infrequently the only subjective symptom of pericarditis is this form of painful stomach affection.

Fads in Eating.—Dr. F. G. Shattuck, of Boston, said that the history of the present movement as to the question of overeating has been of special interest to him because he has been brought personally in contact with some of those personally responsible for its beginning. Fletcher first took up the idea of mastication, lessening the appetite and consequently decreasing the danger of overeating. Afterward his son-in-law, Van Sommer, too up the idea and made some scientific contributions on the subject. Van Sommer used to be a rather stout and good-natured German until after he became Dr. Fletcher's son-in-law and took the new system. He has now become cadaverous-looking, but is satisfied that the new system is effectual in enabling him to maintain his metabolic equilibrium. Dr. Shattuck has dined with Fletcher and Van Sommer, and is rather interested in seeing them chew every portion taken into the mouth thirty times. Beyond this, however, the interest at table is not so noteworthy. While in Europe Dr. Shattuck had the opportunity to meet Dr. Sandrith, of London and Cairo. Dr. Sandrith is per-

haps the most distinguished physician for English visitors to Egypt. He says that he not infrequently has the opportunity to see patients who have been under Dr. Van Sommer's care at Venice, and that the main thing that he has to do with them is to encourage them to eat more, and so build them up to their normal condition of health. This whole question of the amount of food necessary for a given individual must be approached with the greatest care, and the experience of humanity in general is better than that of a few observers, or even of the most scientific investigation until after confirmation of the results by others and careful elimination of sources of error in the investigation. It is well known that the English soldier had to be fed the best, but was the bravest, and the English sailor needs far more food than any other laborer, but is the cheapest human instrument in the end.

False Gods in Surgery.—Dr. Shattuck considers, after listening to the discussion in the section on surgery, that there is much running after false gods. There are two conditions in which Dr. Shattuck believes surgical intervention may become really necessary. One of these is acute perforation, and the other is obstinate cicatricial contraction. Certainly for ordinary ulcer of the stomach the death-rate from operation is too high, and besides there is a liability to recurrence that makes surgical intervention inadvisable.

California Investigations.—Dr. Pond, of California, said that some work is being accomplished at the University of California that has attracted considerable attention in America, but much attention abroad. A German investigator who recently visited California did not hesitate to say that it is the best work on problems of digestion now being accomplished anywhere. Though the investigations concern mainly human beings, they also touch upon animal digestion, and so have been published in the *Bulletins of the Agricultural Department of the State*.

Present Position of Stomach Diagnosis.—Dr. James J. Walsh, of New York, said that the present discussion on gastric disease is likely to be of as much value in clearing the decks for future advances in gastrology as the discussion on kidney diseases was in that department. If there is one department of medicine in which the old saying of Josh Billings has been especially exemplified, it is in the treatment of gastric disease.

Billings said: "It is not so much the ignorance of mankind that makes men ridiculous as the knowing so many things that ain't so." Certainly the number of things that has been known about digestion and indigestion that are not so are legion. More remedies come to the doctor's table and more literature is issued by manufacturing chemists of varied authenticity than with regard to any other class of diseases. Ferments of all kinds, gathered from all fruits and plants and vegetables of all the world, and vaunted as more specific the more distant their origin, have been manufactured and tried, and announced as cure-alls. As a matter of fact it is the chemistry of the stomach of which least is known and little can be done to supply digestive juices. Each individual is a law unto himself, and no one can dictate to anyone else what he or she shall or shall not eat. Pavlov's researches show that the stomach provides a special kind of gastric juice for each different kind of food. The psychic element is more important in the preparation of digestive juices than almost any other

link of the chain of nervous, mental and mucous factors that enter into digestion.

Motility Versus Secretion.—The experience of recent years shows that the motility of the stomach is much more important than its secretion. There are any number of cases on record now in which the motility of the stomach remaining unimpaired, though there was serious secretory disturbance, health was very little interfered with. Many patients suffer from achylia gastrica, a condition in which there is no stomach digestion, yet have no digestive symptoms so long as the stomach remains capable of passing on the material to the intestines. In the cases of stomach cancer, in which large portions of the stomach or even the whole of that organ have been removed, digestion has improved immediately after the operation, and the patients have gained in weight, though living without a stomach. In cases in which serious interference with nutrition as a consequence of failure of stomach motility the surgeons do gastro-enterostomy, and the patient immediately improves in health. It is not good to be without a stomach, nor is the gastro-enterostomized patient equal to the normal individual, but the lessening of the importance of stomach motility is emphasized.

Gastric Symptoms.—In the treatment of gastric symptoms, then, it is important to remember, as a rule, that what is to be modified is not stomach secretion, but stomach motility. If the food will only be passed on properly the intestines will compensate for the stomach, and as nutrition improves the gastric disturbances will disappear as a rule. Many symptoms of gastric disease are really the result of non-gastric affections, the motility of the stomach being disturbed reflexly, and improvement will only occur after the removal of this cause. Many of the tonic bitters, and especially strychnine and related substances, do good much more by acting on the gastric muscle than on the gastric mucous membrane. The stomach cannot pass on food if it is not properly masticated, or if it is too large in quantity. The advice to patients must be, then, mastication and mastication, and again, mastication. The lessening of the amount, especially of the proteid material, is evidently needed in many cases, though it seems not unlikely that the pendulum will swing too far in this matter, and the patients take too little rather than too much food. Above all others stomach patients must be considered as individuals.

Lessening of Fluid.—Dr. Lichty, of Pittsburg, said that by advising patients to masticate more, and to take less fluid during meals and for an hour afterward, many gastric symptoms disappear. Formerly he used lavage, massage and electricity, and found that the improvement that came in this way could be secured by advice with regard to mastication and lessening of the amount of food taken. Coarse food may by its continuous irritation produce hypertrophy of the pylorus. On the other hand, the tonicity of the stomach is increased by proper mastication. The surgeon has a very definite place in the treatment of stomach disease, and while at the present moment there is as much objection to his interference with what used to be considered medical cases, the physician will come to accord him a definite place here. Not infrequently stagnation of food is due to the presence of bands of adhesion. This can only be definitely diagnosed by means of exploratory operation, and no amount of treatment of any kind will give relief without surgical intervention. Dr. Lichty

considers that the examination of the vomit of pregnant women and children by means of test papers, especially litmus and congo, may give valuable information without the necessity for the use of the stomach tube.

Mastication and Limitation of Diet.—Dr. Cooper, of San Francisco, said that if patients only chew their food enough there is no need to dictate a limitation of diet. There will come naturally a limitation satisfactory alike to patient and physician. On the Pacific Coast particularly it is important to remember that in cases of aneurism the introduction of the stomach tube is contraindicated. Dr. Cooper has recently seen five cases of abdominal aneurism, in all of which there were marked stomach symptoms. There should always be a full clinical examination of the patient before the chemical examination of the stomach contents. Dr. Cooper has found that in cases where the introduction of the stomach tube causes great discomfort the use of a strong peppermint tablet five minutes before the introduction has an anesthetic effect that makes it more comfortable for the patient.

Absorption Not from Stomach.—Dr. Bridges, of Los Angeles, said that there was one physiological fact with regard to the stomach omitted from the discussion. This is that the stomach is not useful for absorption, hence the significance of its motor power. The stomach is meant mainly as a reservoir, so that food may be taken at reasonably long intervals and properly mixed here. Even water is not absorbed from the stomach, and the organ is a convenience, but not a necessity. It is important, however, to decrease the useless labor put upon the stomach, especially in crushing the food not masticated. It is not true that the stomach produced directly other diseases, but is itself much influenced by all other organic affections.

Proteids After Adult Life.—Dr. Frank Billings, of Chicago, in closing the discussion, said that it is hard to decide just how much proteid must be taken, but only enough is needed to make up for body waste. Carbohydrates and fats supply the fuel for its energy. It is interesting to know that Fletcher and Van Sommer are relatives in law, and it is possible that their sacrifices in so good a cause may prove for the benefit of humanity. Undoubtedly too much proteids are consumed under the present dietaries, and a reaction in the opposite direction will do good. Dr. Billings wished to remind investigators of gastric contents that whenever bread is employed in the test meal, even though it be two days, yeast cells are sure to be found in the stomach contents when removed. They may be thought to be abnormal or to have some significance, but they have not.

Gastric Mucus.—Dr. Dock, in closing the discussion, said that practically any mucus visible in the stomach contents is abnormal. The examiner must, however, be sure that the mucus does not come from the mouth or the respiratory passages, or from mechanical irritation of the mucous membrane of the stomach, owing to awkwardness in the manipulation of the stomach tube. Dr. Dock considers that test papers are good in the analysis of stomach contents, but should be controlled by the burette, and the original practice in chemical investigation of the stomach should be made with the burette for proper discipline. The vomit of patients will not replace the stomach tube, and even when material is vomited there may still remain a considerable amount in the stomach of quite different material. When

sarcines are present in large quantities, then the condition is not malignant. Yeasts do occasionally occur in cancer. Dr. Dock is sorry that he cannot agree with Dr. Walsh in considering that the shutting off of the stomach so as to allow the passage of contents is at all an answer to gastric difficulties. After gastro-enterostomy occasionally peptic ulcers occur, and the last condition is worse than the former. There is a middle ground of surgery and nihilism in gastric therapeutics in which very encouraging results may be obtained.

Non-Gastric Disease Percentage.—Dr. Musser, of Philadelphia, said that 65 per cent. of stomach disease is secondary to affections in some other parts of the body. More than 10 per cent. of these cases at least present none but stomach symptoms, and at the beginning of obscure affections of other organs there is still a larger proportion of obscure gastric symptoms. Practically any organic disease in the body may produce secondary gastric conditions, and nearly all of them do eventually.

Mastication Most Important.—Dr. Stockton, of Buffalo, in closing the discussion, said that there is a proneness in the present day to say that organs are not necessary. To some extent it is true the stomach function may be eliminated without very serious results. Nature sometimes produces a condition of achylia gastrica in which there is no stomach digestion, and an increase of motility hurries the food on into the intestines, to be digested there. Dr. Stockton has not, however, ever seen a case of achylia gastrica in which the patient was well. They come to the physician not complaining so much of stomach symptoms as of nervous conditions of various kinds, lassitude, lack of energy, and nervous depression. Anemia is a common result of this lack of stomach digestion. The physician must then, by his advice with regard to mastication and a lessening of the amount of food taken, secure stomach motility and the prevention of interference with it as far as possible as well as taking care of stomach secretions.

Dr. Billings, in closing the discussion, said that there were three books that he should like to recommend all the members of the American Medical Association to read, the reading of which he was sure would give them more practical information than any other he could name. They are: "The Physiological Economy of Nutrition," by Prof. Chittenden, of Yale University; Dr. Follin's articles on "The Physiology of Digestion," which appeared in the *Journal of Physiology* for the first three months of the present year, and Prof. Pavlov's book on the "Physiology of the Digestive Glands," which, written originally in Russian, has been translated, and is the most valuable contribution to gastric physiology made in recent times.

Dr. W. D. Brydone-Jack, of Vancouver, the President of the British Columbia Medical Association, asked to be allowed to invite the members of the American Medical Association to stop off on their way home, and attend the sessions of this Canadian Medical Society, which will be held on Tuesday and Wednesday, July 18 and 19, that is, in the week following the meeting of the American Medical Association.

Coccidioid Granuloma.—Dr. W. Ophüls, of San Francisco, discussed the gross morbid appearances of this disease, of which only a few cases were known a few years ago, but which is now recognized as occurring not uncommonly. At first it was thought

to be due to a protozoon; then its etiology was attributed to a coccidium. After a time, however, it was found that cultures of the micro-organism could be made, and that it grew not unlike a mould. As this is called oidium, Dr. Ophüls has considered that the name coccidioid would be especially suitable. The symptoms produced and the pathological lesions are not unlike those produced by blastomycetes. The disease is, however, quite distinct from blastomycosis.

Discussion of New Cases.—So far some ten cases of the disease have been reported, and to these Dr. Ophüls adds three new ones. One of these was suspected to be malaria, a second was for years thought to be chronic meningitis of tuberculous origin, and the specimens were exhibited as characteristic of tuberculous inflammation of the meninges. Years after the death of the patient the parasites were discovered in the tissues. Another case was caseous, osteomyelitis, a fourth case was caries of the elbow in a Chinaman diagnosed as tuberculosis. It is evident that the affection can only be recognized by means of a microscope. It presents a great variety of lesions usually bearing a striking similarity to those of tuberculosis in its manifold manifestations.

Pathological Conditions.—It is an infectious granuloma, and its lesions bear a striking resemblance to most of the other infectious granulomata that makes its diagnosis extremely difficult. It produces small and large chronic abscesses, and its cutaneous lesions resemble those of glanders. It is probable that the skin manifestations are primary, and that from this as a focus of infection the disease becomes generalized at the end. A characteristic of the disease in the lungs is that it is not limited to these structures, but extends by continuity into the mediastinum or into the soft tissues of the neck. Whenever it finds its way into the blood current miliary coccidiosis occurs. The generalization resembles that of tuberculosis very much. The bones are very often infected and caseation of the adrenals is not uncommon. In animals experimented upon, especially guinea-pigs, the involvement of the genitalia is frequently seen. This resembles the corresponding lesions in glanders more than anything else.

Frequency of Disease.—Dr. Ryfkögel, of San Francisco, said that this affection is evidently more common than has been thought. Its skin lesions especially have been mistaken for other and supposedly more benign affections. This is especially true in regard to eczema and various forms of tuberculosis of the skin. Various attempts were made to inoculate the disease into animals without success, as a diagnostic measure and for purposes of investigation, until it was found that not infrequently the micro-organisms were enclosed in tough fibrous tissue from which they could not readily escape. Even when intravenously injected the injection was unsuccessful. The intraperitoneal injection succeeded, however. After the tissues were ground up in a mortar, so as to free the micro-organisms, then infection took place more regularly.

Thyroid Disease in California.—Dr. Herbert C. Moffitt, of San Francisco, said that thyroid affections were more frequent in California than had been thought. The presence of aneurisms and of arteriosclerosis are certainly more common in California than in other parts of the country, and something of the same thing seems to be true with regard to thyroid. Endemic goiter is perhaps not as common as in Washington and the northern part of the

Pacific Coast, where in certain of the valleys even animals are reported as suffering from enlarged thyroids. The tradition as to the occurrence of cretinism in California has been denied. Moderate enlargements of the thyroid are quite common, however. Five per cent. of young women entering the University of California suffer from some enlargement of the thyroid. Goiter is said to be less common in Southern California, and yet the statistics of the High School show 8 per cent. of the affection. In the interior the population is less affected.

Exophthalmic Goiter.—This disease occurs quite commonly and in two forms, in one of which the sexual and mental symptoms are more predominant than the nervous symptoms. It has been recently claimed that when the parathyroids are affected the sexual and mental systems are apt to suffer more. Not infrequently exophthalmic goiter eventually develops into a form of disease in which there is a lack of secretion of the thyroid, and in which fat pads may be noted above the clavicles and in the back of the cervical regions. In advanced cases there is a bib-like pad over the sternum and an apron over the abdomen. Many of these patients suffer from the dry skin, the pains in the joints, thinness of hair and lack of strength, which characterizes myxedema.

Iodine and Its Compounds.—Iodine certainly has an important relationship to the thyroid secretion. The abuse of potassium iodide in cases where there is already excess of thyroid secretion is sure to do harm. Kocher, of Berne, who has studied this class of cases very fully, considers that many of the thin, nervous people who jump at every sound have an excess of thyroid secretion, while phlegmatic people have a deficiency. In these cases it is necessary to be particularly careful in the use of potassium iodine. Kocher has found over and over again that the use of this drug emphasizes symptoms already present, or brings them to notice when they have scarcely at all existed before. The most important early symptom is the fixed stare or glare so characteristic of exophthalmos. Care must be exercised, however, in studying this. Among the Southern nations who are accustomed to use their eyes much in talking, who, as it were, gesticulate with their eye muscles, a much better command of the eye is the rule than in other persons. They can look unwinkingly for long periods, and give one the idea that the Stellwag symptom is present. With regard to their rapid heart, it must always be remembered that certain nervous affections may produce it. Dr. Moffitt has seen it, for instance, in growing boys who indulged to considerable extent in masturbation. An excessive use of tobacco in boys will also produce the same sort of nervous cast heart.

Potassium Iodide in Diagnosis.—It should be remembered that potassium iodide will aggravate the symptoms of Graves' disease, and this may in doubtful cases be used for diagnostic purposes. It emphasizes the necessity, however, for great care in the use of iodine preparations and of thyroid extract in these cases. It very seldom happens, however, that a patient suffering from Graves' disease comes without giving the history that at some time they have been treated by thyroid extract. The unpleasant symptoms pronounced by the iodine preparations, and especially by potassium iodide, may be relieved by Fowler's solution, which acts not alone upon the cutaneous lesions, but also upon other manifestations.

Treatment.—For the nervous symptoms the bromides are the best. Phosphate of soda will be found of use, because it helps to alleviate the intestinal symptoms, while the bromides control the heart and restlessness. Parathyroid extract has been recently recommended, but does not seem to be of much service. Horsley suggested division of the isthmus of the thyroid as a surgical procedure, and obtained good results from it. Other surgical measures, such as removal of portions of the thyroid, have produced good effects in severe cases where complications were to be feared. Dr. Moffitt has employed rotagen during the last few months, and has obtained some good results. One patient has taken the remedy for eighteen months, six grains daily, and it has apparently controlled the pulse and other symptoms. One patient has taken the remedy for five months in similar dose, and is much better. A more pronounced case has taken it for four months, but without effect. Its employment in many further cases is needed in order to determine its absolute value.

Parathyroid in Graves' Disease.—Dr. James J. Walsh, of New York, said that as the result of Dr. McCallum's studies in Baltimore, and Prof. Gleys' investigations, witnessed in Paris years ago, he had been tempted to use parathyroid extract in some cases. Altogether four cases have been treated in this way, two of them apparently with good results, and two with a deterioration of their symptoms, possibly due to the parathyroid material they were taking. The two first cases were mild and of the kind in which suggestion plays a large rôle in the treatment, and in which intermission of symptoms are not unusual. The cases unimproved were of the severer type in older persons not much influenced by suggestion and usually without intermissions.

Graves' Disease in Old and Young.—As a matter of fact, under twenty-five years of age the symptoms of Graves' disease not infrequently disappear, sometimes to be absent for a long period, after very little treatment. In older cases of Graves' disease, however, intermissions are much rarer, and it is on these cases particularly that new remedies must be tried. In young persons the prognosis is not unfavorable unless acute complications threaten, such as interference with breathing or conjunctivitis as the result of exposure of the eye. In one case a very severe type seen when the patient was sixteen to eighteen years of age, complete remission of symptoms took place after treatment of the intestinal tract, and ten years afterward, though the patient had had in the meantime two children, there has been no return of symptoms.

Avoidance of Thyroid Extract.—Dr. Wells, of Chicago, said that he has, during the last twenty years, seen many cases of Graves' disease, and in very few of them has he not found on careful inquiry a history of thyroid extract being given as a remedy for the disease. Without exception, all of these patients have been made worse during the time they took the thyroid extract, and it is evident that a warning is needed in order to keep practitioners of medicine from experimenting with this harmful substance. In Dr. Wells' own experience codeine has been the most useful drug for the control of the nervous symptoms, and its use may be prolonged almost indefinitely. During the experience of the last few years particularly this has proved an excellent remedy.

X-Rays for Graves' Disease.—Dr. Firmly, of Tacoma, Wash., said that in a certain number of cases

of Graves' disease treated by X-rays he has obtained improvement by exposures to the X-rays. Cases that do not yield to other remedies seem to do very well under this. Out of six cases only one failed to be benefited.

Spontaneous Fluctuation.—Dr. McCaskey, of Indiana, said that spontaneous fluctuations of the symptoms of Graves' disease are so common that it is difficult to decide whether a remedy is helpful or not. Intermissions occur, but after a time the symptoms recur. His experience with operative treatment has not been very favorable, though in some cases improvement has occurred a considerable time after the operation.

Dr. Whiteside, of Portland, said that quite a few dogs in the neighborhood of Portland suffer from enlarged thyroids. These have a more rapid pulse than other animals of the same species, but do not suffer from prominence of the eyes.

Frequency of Enlarged Thyroid.—Dr. Grandee, of Norfolk, Va., said that there are more enlarged thyroids in nature than has been thought. In his own small practice he has seen many of them. Whenever the thyroid is increased in size patients are nervous and have a tendency to rapid pulse even though there may be no definite symptoms of Graves' disease. When the thyroid secretion is decreased patients are inclined to be fat and have a slow pulse. These need thyroid extract, while the thin, nervous person is always harmed by it.

Incomplete Graves' Disease.—Dr. Lichty, of Pittsburgh, agreed with Dr. Grandee as to the frequency of Graves' disease, and added that in no disease is early diagnosis so important as in this affection. If any two of the cardinal symptoms are present, then the diagnosis of Graves' disease should be considered justified. Besides the rapid heart, the enlarged thyroid, and the prominent eyes, Dr. Lichty considers that tremor and increased perspiration should be considered as cardinal symptoms. Young women should be warned when such symptoms are present of the danger of skating, bicycling, gymnastic exercises, and other overexertion. Cures are obtained by means of the rest treatment, and where these fail the removal of a portion of thyroid is the best method.

Exophthalmic Goiter and Myxedema.—Dr. Moffitt said, in closing the discussion, that patients suffering from Graves' disease for many years slowly slip into myxedema. Treatment is not so hopeless in the old, in his experience, as has been said. When gastric symptoms are present these must be treated, and for the nervous symptoms the bromides and belladonna are especially effective. Dr. Moffitt has found that in young women particularly operation gives excellent results very frequently, to his knowledge four out of five cases having distinctly improved, though the symptoms had been very severe.

Type of Tuberculosis on the North Pacific Coast.—Dr. Woods Hutchinson, of Portland, Ore., described a special type of pulmonary tuberculosis which seems to exist on the North Pacific Coast, especially in Oregon, Idaho, Washington and Montana. It has the following characteristics, which have been noted at the Washington State Sanatorium for Consumptives, not far from Portland. The sanatorium is not long open, and only 81 cases of tuberculosis have been under treatment; 36 of these have proved to be of this specially virulent type, and some 25 other cases, in private practice, of the same type, have been carefully studied. The most striking fea-

ture of the cases is the rapidity of their course. The most careful examination of the history fails to show any affection existing more than three to four months before they come under observation, and yet the patients are in the third stage of pulmonary tuberculosis. Besides this rapid course there is a very weak and rapid pulse, which sometimes cannot be detected at the wrists, and often cannot be counted there, but must be examined with the stethoscope over the heart itself.

Temperature.—Besides the high pulse the most characteristic feature is the temperature, which is not high, but is often markedly subnormal. Not infrequently a temperature of 94° or 95° F. in the morning will be found to occur, though the afternoon temperature is not much above 99°. In one case the early morning temperature was only 93° F., and the afternoon just normal. It seems not unlikely that some of these cases run their course with a permanently subnormal temperature.

Pulmonary Physical Signs.—The absence of physical signs is a noteworthy feature of the cases. There are very few râles, and no bronchial breathing at the beginning. There seems to be no disturbance of the percussion of note. After a time, however, familiarity with the cases shows the presence of a boardlike tympany that simulates the normal percussion sound. At the autopsy the lungs are found to be infiltrated on the surface without any special affection of the apices of the lungs. The anterior surface of the lungs is more affected than other portions. This thickening of the anterior surface sometimes gives rise to an apparent absence of air sounds, and makes the breathing distant. At the autopsy the lungs are hard to get out of the thorax, because, instead of being shrunken, they are enlarged and are found indented by the ribs. There is a marked absence of cavities.

General Symptoms.—Another feature is the absence of hemorrhage. Early in the case there is very little cough. For the first three months there is a little hacking in the morning that seems to be scarcely more than a catarrhal raising of superabundant mucus. The expectoration is slight, of glairy consistency and seldom contains tubercle bacilli. When the bacilli are found they have certain special characters of their own. They are short and thick, and resemble those seen in bovine infections. Dr. Ravenal, when consulted on the subject, ventured to suggest that the description of the bacilli associate them with this form of infection from animals, and as Washington and the other States are cattle-raising countries, the reason can readily be understood.

Etiology of This Type.—Dr. Hutchinson does not find that this special type is due either to the altitude or to the moisture of the places in which patients live. Some of them have come from along the Sound, where they have been living practically at the level of the sea, while others come from back in the Cascade range of mountains at rather high altitudes. Needless to say, these various altitudes present very different conditions of moisture. Race seems to have nothing to do with the development of the disease, though most of those affected are Americans of the second or third generations, who have been living in the Northwest for some time. It will be recalled that the Indians suffer very severely with tuberculosis—presenting a death rate of over 50 per cent., though they live in tents and have all the advantages apparently of the outdoor treatment by their natural habits of life. The Indians present no

racial immunity to the disease, and it would seem as though the Northwesterners have lost their racial immunity, as the result of long living in the outdoor air.

Heart Weakness.—The subnormal temperature, the marked feature of the cases, seems to be due to the fact that the systems of these patients do not react sufficiently to produce a rise in temperature. The difficulty is the weakness of the circulation, consequent upon more or less heart failure. The heart is weak out of all proportion to the other organs. In all cases of pulmonary disease the prognosis depends more on the heart than it does on the lungs. This is especially noteworthy in pulmonary disease, but occurs also in tuberculosis, though it has not been taken sufficient account of. It is well known that a rapid pulse at the beginning of tuberculosis usually makes an unfavorable prognosis. In these cases the galloping heart which, as the disease advanced, became even embryonic in its sounds, giving the tic-tac or equality of sounds. The sound being nearly equal in length to the first, that in all affections makes an unfavorable prognosis.

Temperature Range.—Dr. Woods Hutchinson says that the important diagnostic lessons in these cases is the necessity for studying not alone the febrile temperature of the patient, but the whole daily temperature range. Sometimes it is said that unless a patient has a temperature of 99.5° F. that there is no fever. If, however, it will be found, as is not infrequently the case, that the morning temperature is below 97° F., or even lower, then anything above 99° F. in the afternoon indicates a serious interference with the average normal temperature. In fact, whenever the temperature range has a variation of more than one degree and a half in the twenty-four hours, there is some toxin being absorbed into the circulation which causes a disturbance of the daily normal temperature rhythm. In all cases of tuberculosis, then, careful observation should be made to determine the temperature range.

Acute Miliary Tuberculosis.—Dr. Cheney, of San Francisco, said that for ten years he has been carefully studying cases of tuberculosis as they occur in San Francisco, and he has not seen the type of tuberculosis suggested by Dr. Woods Hutchinson, so that it is not common at least along the Southern Pacific Coast. Acute miliary tuberculosis, as it occurs in San Francisco, resembles these cases described by Dr. Hutchinson not a little, but it does not occur near so frequently as described by Dr. Hutchinson. After all, it must not be forgotten that considerably more than one-third of his cases are of this rapidly progressive type.

Dr. Miller, of Chicago, suggested the possibility of secondary infection in the specimen presented by Dr. Hutchinson.

Hasty Consumption.—Dr. Norman Bridges, of Los Angeles, said that the cases described by Dr. Woods Hutchinson in their rapid development resembled very closely the cases of miliary tuberculosis that used to be called hasty consumption, Phthisis Florida of the old text-books. In these cases the temperature is frequently not high at any time. There is not very much expectoration, and the breaking down in the lungs is not nearly so prominent as in other forms of consumption. What needs explanation, however, is the frequency with which these cases occur in the Pacific Northwest. The physical signs, too, are usually more prominent than suggested by Dr. Hutchinson. There are always minute crepitant

rales resembling the crepitant râles of pneumonia. Their presence is due to the rapid infection of the surface of the lungs, which causes a correspondingly rapid consolidation. Death takes place in from a few weeks to a few months.

Race Susceptibility.—Dr. Brown, of San Francisco, said that the description of Dr. Hutchinson's cases vividly recalled the progress of tuberculosis as it is seen in especially susceptible races. The case of the Indians has already been suggested. The Chinese are another race that prove very susceptible to this disease, and in whom it runs a very rapid course. This would seem to be due partly to the absence of proper habits of life among the Chinese, and a lack of the nutrition suitable for our climate. The pathological specimen presented by Dr. Hutchinson resembles not a little the conditions seen in monkeys that have developed tuberculosis. Not a few of the soldiers returning from the East brought monkeys with them, and many of these succumbed eventually to tuberculosis. At autopsy they presented lesions not unlike those of acute miliary tuberculosis of human beings, and like those described by Dr. Hutchinson and seen in the specimens.

Secondary Tuberculosis.—Dr. Ophüls, of San Francisco, said that the lungs presented by Dr. Woods Hutchinson constituted a very rare specimen. They resembled more the lungs of pearly disease of cattle than tuberculosis in human beings. The most notable characteristic is the almost complete absence of cavities, notwithstanding the advanced tuberculosis process. In cattle, too, there is always considerable calcification of the nodules of tuberculosis, absent here. Dr. Ophüls has never seen a tuberculosis lung like this either in Europe or in America. Certainly they do not occur in California. It seems likely that this case is an example not of primary tuberculosis, but of a secondary process consequent upon a primary focus somewhere else in the body.

Dr. Mackay, of Oregon, said that the disease described by Dr. Hutchinson resembles miliary tuberculosis, though of course it may be an unusual type, possibly of bovine origin.

Dr. Moffitt said that this type of tuberculosis resembled somewhat the pneumonic phthisis seen in the susceptible, and occurring among the Chinese. Even this, however, is much rarer than the affection described by Dr. Hutchinson, and has certain distinct differences.

Primary Kidney Tuberculosis.—Dr. Woods Hutchinson, in closing the discussion, said that in the case from which the specimen was presented the primary lesion had been in the kidney. The symptoms presented by the kidney tuberculosis were so acute that an operation was performed for stone in the kidneys. At the operation the true condition was discovered, but after three months the patient died with the lesions shown at autopsy. Undoubtedly the case resembles cases of tuberculosis in animals more than in human beings. In some experience at making autopsies at the London Zoo corresponding lesions were seen. In the Indian reservations this same type occurs very frequently. It would seem then that susceptibility had nothing to do with the virulence of the infective process.

Value of Various Hemoglobin Instruments.—Dr. M. Howard Fussell, of Philadelphia, discussed the value of various hemoglobin instruments to the general practitioner of medicine. Fifty patients were taken unselected and studied by means of the Dare, the Fleischl and the Tallqvist scales. At least two

observers used the same method of estimating the hemoglobin on each patient. As a result of this study it was found that the variation of the amount of hemoglobin present was very slight. The personal error amounts to at least as much as the instrumental error, but neither of them are sufficient to vitiate the conclusions that may be drawn from them. It is a comparatively easy matter to learn to use any of these instruments, and Dr. Fussell pointed out how significant is the knowledge that may be obtained from them. In all cases of anemia the recognition of the amount of hemoglobin present gives very definite information and indications for the employment or non-employment of iron therapy. This of itself would be sufficient to bring the instruments into much more general use than at present.

Officers.—The following officers for the medical section were elected for the ensuing year: President, Dr. Herbert C. Moffitt, of San Francisco; secretary, Dr. Miller, of Chicago. Dr. Dock, of Ann Arbor, was elected the representative of the section in the House of Delegates.

BOOK REVIEWS.

DISEASES OF THE HEART AND AORTA. By THOMAS A. SATTERTHWAITHE, M.D., Professor of Medicine in the New York Post-Graduate Medical School; Consulting Physician to the Post-Graduate, Orthopedic and Babies' Hospitals; President of the Medical Association of the Greater City of New York. E. R. Felton, New York.

FROM his full grade as a teacher and clinician Dr. Satterthwaite has realized the genuine need of a work upon this intricate and interesting subject which combines brevity, clearness and rationality with practical and modernness of thought.

Purposely he has restricted, so far as possible, the anatomy and surgery of the parts, dwelling chiefly upon physical diagnosis, symptomatology and treatment, to the latter of which he devotes particular attention, giving at some length the Manheim method, with American adaptations, fully illustrated.

Throughout the text he has inserted more than one hundred illustrative cases which are both useful and instructive.

The author faithfully maintains the scope to which he has restricted his efforts, and as a handy book it deserves to become popular.

THE MEDICAL ANNUAL; a Year-book of Treatment and Practitioner's Index. Twenty-third Year. John Wright & Co., Bristol, England.

THE contributors to the Medical Annual number some of the distinguished English medical men, besides some well-known Americans. There is no doubt that this work represents each year one of the best compilations of the progress of medicine that is on the market. It is especially rich in illustrations that illustrate, and in practical hints for therapeutics. It is rather curiously interesting to find under the head of the treatment of smallpox by red light, the fact that the Chinese have for many centuries treated smallpox patients in this way, but after all, many of our most satisfactory empiric remedies date back to the time when their origin was lost in the mists of tradition, and it is hard to understand just how they came into use. For a single volume annual we know of none better than this.